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CONTENTS

The Problems of Medicine. Carl F. Moll, M.D...617

The Pulmonary Cavity and Its Control. William A. Evans, M.D.... 621

Diagnosis of Early Tuberculosis in the Strict Sense of the Word. J. Arthur Myers, M.D. 632

The Diagnosis of Bone and Joint Tuberculosis. Don King, M.D.... 637

Undulant Fever (Brucelliasis). Walter M. Simpson, M.S., M.D., F.A.C.P.... 639

Examination of the Back. Donald C. Durman, M.D.... 645

The Ship Surgeon's Career. Wynand Pyle, M.D. 648

The Embryohormonic Relations of the Endocrine Glands. Part II. Robert C. Moehlig, M.D.... 656

Michigan's Department of Health. C. C. Slemons, M.D., Dr.P.H.... 667

Editorial:

Dr. Le Fevre President-Elect.... 669
President Moll's Address.... 669
Out of Bounds.... 670
Trends in Medical Science.... 671
Automobile Accidents in Michigan.... 671
A Century Dead.... 672
Medicine, Supply and Demand.... 672

Medical Economics:

Medical Reform: Lord Dawson of Penn, London.... 674

General News and Announcements.... 675

Communications.... 676

Obituary.... 677

Society Activity.... 677

County Societies.... 679

Of General Medical and Surgical Interest.... 680

The Doctor's Library.... 682

THE PROBLEMS OF MEDICINE

CARL F. MOLL, M.D.

FLINT, MICHIGAN

My term of office as your President has gone only too fast, and I desire at this time to express my appreciation of the honor bestowed upon me. There may have been some differences of opinion in carrying out certain policies. However, the year with its associations has been most pleasant. I express my sincere thanks to the Council, especially its Chairman and Executive Committee, for their earnest, painstaking work. My work has been made easier by the worthwhile advice of our Editor, and the rough spots have been made smoother by our most efficient and capable Secretary.

I know that my distinguished successor will direct you to new heights in medical progress, even in these perilous times.

As we survey the world today, we find conditions without precedent. We are confronted with social, financial, political and economic unrest. We find all of our preconceived ideals shattered, all of our well-formulated plans for the betterment of humanity out of alignment. We find many, not only in our own profession, but in all of the trades and professions, bordering on a state of hopelessness and despair. Yet, amid all of this economic chaos, we have men en-

*Address of the President of the Michigan State Medical Society, Kalamazoo, Mich., September 14, 1932.

dowed with keen judicial minds, sublime courage and strong guiding hands, who will succeed in extricating us from our present difficulties.

Three hundred years ago, the French philosopher Rene Des Cartes wrote: "If ever the human race is raised to its highest practical level, intellectually, morally and physically, the Science of Medicine will perform that service."

We must act today.

If I can, even in a small measure, direct your thoughts and energies along lines that will bring about these desired ends, I will have attained my goal.

Of first importance is the proper education and training of our undergraduates, directed by the Council of Medical Education of the American Medical Association. The Medical Schools in this country are being conducted to give the student efficient medical training in the various scientific branches. These requirements are necessary to prepare him properly for his future endeavors in the healing art. He has had his academic, pre-medical, medical, interne training and in many instances residency in well equipped modern hospital, and quite often he spends a year or two abroad in further study.

After this intensive training he should be well prepared to enter his future work. He is told that it is his function to apply in practice the means and measures which have been found by his teachers to be of benefit. He has been well trained in laboratory work and technical procedure; he has been skillfully instructed in history-taking and has been taught how to correlate his findings; in fact, all of this preparation has had but one object, namely, that of making a good clinician. He now takes his place in the ranks of the regular profession and unless he has been happily endowed with an aptitude to care for the sick, he soon finds himself out of step, straggling on the side line or relegated to the rear.

There should be a course of lectures given in every medical school on medical ethics in the broadest sense of the term. Instruction should be given by outstanding men in active medical practice, internists, surgeons, and general practitioners; men well qualified scientifically and socially, who have the ability to impart this knowledge, and not by the regular teaching staff of the universities.

An auspicious sign is the general interest being shown in various medical schools in reducing the time and money cost of securing a medical education, in order that a man need not use so much of his youth and years of earning power preparing for the more elemental branches of medical practice. This can well be done without reducing his professional efficiency. There has been some modified revival of the old preceptor plan. The University of Wisconsin, Harvard University Medical School, the University of California, our own State University have apprenticed students during vacation between their Junior and Senior years, to men in general practice who have been especially selected for their ability and outstanding qualifications as teachers. This is a most commendable experiment and will undoubtedly find a wider field of usefulness.

Medical service will always remain a personal service. Personal service is the solid foundation of medical practice.

The young practitioner should realize that each patient is an individual problem and cannot be treated by a standardized method similar to the assembly line as seen in a modern automobile factory. He should be willing to efface self and anxious to assume his full responsibility for the welfare of his patient. Then and only then he will begin to be of real service to his fellow men.

Articles without end have been, and are still being written, on the cost of medical care. Many of these deal entirely with local problems, others with general problems. Some of these writers have made a serious study of the various phases of the situation and have offered in many instances, plausible, constructive plans for their alleviation. Others from some personal motive, real or imaginary grievance, have written pages that will not bear close study or analysis.

With the building and equipping of the modern hospital, with its routine, X-ray and laboratory examinations, to say nothing of their special procedures, as bronchoscopy, cystoscopy, basal metabolism and many other technicl diagnostic tests, it is but a logical sequence that the cost of medical care has advanced, but it has advanced no faster than this cost of our improved living conditions.

Thirty-five years ago when I began the practice of medicine, the X-ray was a scientific curiosity. Its greatest possibility as a help in diagnosis, was the location of foreign bodies and the help given us in the proper reduction of fractures. The blood pressure apparatus had not been perfected. Basal metabolism tests had never been made. The blood Wassermann was not even dreamed of. Diphtheria antitoxin, insulin and the various liver preparations used in pernicious anemia were still undiscovered. The laboratory technician and the trained nurse, as we know them today, did not exist. The number of hospital beds has increased fifty fold. Neither did we know automobiles, aeroplanes, radio, modern sanitary plumbing, vacuum cleaners, the movies, nor the purchase of practically everything on the installment plan basis.

The public demands the best, irrespective of the cost, and the doctor who is not in full accord with their wishes, soon finds himself displaced by a more obliging brother practitioner. Certainly the cost of medical care which has existed during the era of our recent so-called prosperity, is prohibitive for the great majority of our people.

And yet not over 30 to 35 per cent of the money so expended for medical care finds its way into the pockets of the family doctor. The hardest of all things, for the rank and file of the medical profession, is to see things in their true perspective, for never has such a multitude of complicated issues confronted them. If they have the best interests of their patients in mind, they do not wish to deprive them of anything that will speedily restore them to normal health. Yet we all know that we are responsible for much unnecessary hospitalization. Instead of discouraging we only too often encourage the employment of trained attendants in cases where their need is of doubtful value. We advise many needless laboratory examinations and we many times refer our patients to specialists because we have not the courage of our convictions, or we are too lazy to do our own thinking. These are matters which demand more attention and study. We must devise means that will give the great middle class the same medical care and nursing service which is now available only to the very rich or very poor. This must not be done by making them objects of charity, but by furnishing them efficient service at prices within their income. We must resist any attempt to lower the cost of medical care at the cost of lower medical service. This can best be accomplished by taking the public into our confidence and explaining the reasons for or against certain procedures. Help them to finance their unexpected expenditures. This can, in most cases, best be done through one of the local small loan companies owned and controlled by the business and professional men of their community.

There is no one factor that is as conducive to continued friendly relations between physician and patient, as a paid bill for professional services. Further, most self-respecting wage earners would not go to free clinics or dispensaries if they knew they could avail themselves of a financial service of this type to help them pay for their needed medical service. This accomplishes a threefold purpose—keeping your patient and being paid for keeping him, and greatest of all helping him keep his self-respect. The man who once accepts charity, even under dire circumstances, has lost a certain moral fineness of character that he can never regain.

A Special Committee on the Survey of State Health Agencies, which has been ably directed by Dr. W. H. Marshall, has not as yet completed its work. There is ample evidence that its final report will have a vast fund of information which will be of great help to us in dealing with the economic health problems, not only in Michigan but throughout the land. This subject is universally interesting, and any constructive work done in this direction cannot help but be of great value, especially in its relation to the general socialization of medicine and bringing forcibly to the minds of the medical profession the thought that organized medicine must assume the full responsibility of medical care, in the proper time, place and manner, if it is to continue to maintain its leadership in health matters.

The specter of State Medicine has been stalking before us perhaps more persistently of late than in the years of greater prosperity. It is my belief that this period of curtailing expenses and retrenchment in every form, and the fact that the fear of increased taxes will per se, put an end, for

the time being, to this wholly un-American idea. Furthermore, the thinking public is beginning to realize that the surest way to curtail the progress of scientific medicine is to take away the incentive for individual effort. There has been an attempt made in some quarters to link old age pensions and some type of sickness insurance, to provide modern medical care for those who are unable to otherwise procure it. Due to the more careful physical and mental selection of applicants for work in all large industrial corporations and the periodic health examination of employees, which is now part of the routine work of the Industrial Surgeon, it is inevitable that some provision will be made for old age pensions.

Sickness insurance need not be objectionable if it does not involve the medical profession in any form of governmental contracts. The history in this country of Compulsory Sickness Insurance dates from 1907, when the late Professor Henry Seager at a meeting of the American Association for Labor Legislation, held in Madison, Wisconsin, outlined a plan for wage earners which would provide for "illness not directly traceable to the employment." This plan must be sought either in Compulsory Illness insurance or in a subsidized and state divested sick insurance club. It is said that Professor Seager thought the later plan better suited to American conditions than compulsory sickness insurance.†

During the next four or five years there was considerable interest shown in this movement by various social and labor workers, notably that of Dr. Lee Frankel who was sent to Europe by the Russell Sage Foundation to study the various types of sickness insurance then in vogue on the Continent. In 1911 the Workingman's Compensation Law was enacted by the Legislature of the State of Michigan, and this legislation was also inaugurated in many other states of the Union. Active interest in Sick insurance was held in abeyance, while the experiment of the Workingman's Compensation law was being actively studied. For the following two or three years, there was not very much public agitation of the subject, but in 1915 the Social Insurance Committee of the American Association for Labor Legislation, published its nine "Standards" for a health insurance law.

In 1915 the American Medical Association, alive to the interests of its members, appointed a special committee "to study Social insurance in its relation to the medical profession." This committee made a rather lengthy report at the Detroit meeting in 1916. Health insurance as it existed in Europe, and its relation to the medical profession, was gone into with considerable detail. This "Standard Bill" of the Association for Labor Legislation had been carefully analyzed and a rather comprehensive report of its probable feasibility as it affected the practice of medicine, was given. The Committee made no definite recommendations. At this time there was a great deal of interest taken in this subject by various social, economic, labor and medical bodies. A resolution was introduced into the House of Representatives to create a Federal Commission to prepare plans for a National Sick and Unemployment Fund. There were a number of public hearings, the chief opponents to the measure being representatives of the American Federation of Labor, and various industrial insurance companies. Nothing came of this resolution at this time. It was again brought up in the following year but was never reported out of the Committee.

Our entrance into the World War and the period of readjustment following it, caused this subject to be lost sight of and there was nothing heard regarding the matter until about 1920, when a number of states, namely, Pennsylvania, Ohio, Wisconsin, New York, Illinois and Massachusetts began to get reports from Commissions that had been created some years earlier, to study this and allied matters from various angles. The most striking thing in these reports was the wide variance of opinion held by the individual states, and by the individual members of these Commissions. The majority report of practically all of these commissions was that no legislation be recommended. It is a significant fact that there has been but little or no effort made since to revive this subject.

It is true that we have a wider application of sickness insurance than heretofore, inasmuch as we have had medical care and sick insurance in the iron, copper and lumber industries in Michigan for over eighty years.

†"The purchase of medical care through fixed periodical payments." Pierce Williams.

It has gained but little foothold in other industries until recently. In the Automobile industry it is not being practiced and a fixed regular deduction is made from each workman's wages for which he receives a fixed weekly sum in case of accident (non-compensable) or illness, and he further has choice of his medical attendant.

From this very brief review of the subject, I think you will agree with me that as long as we have united professional action in studying all theories and proposed plans for sickness insurance, and are prepared to meet them and direct them in an intelligent manner, we shall have little to fear in an economic way.

I want to impress you, young medical men, with the fact that you can make these adjustments without great difficulty. Youth has the enthusiasm for pioneering, the eager energy for conquering new frontiers. The opportunity confronts you, and you now have the task of working up to it. Be cheerful, be unafraid, be faithful to yourselves, and we of the old guard will retire, knowing that all will be well.

THE PULMONARY CAVITY AND ITS CONTROL*

WILLIAM A. EVANS, M.D.†
DETROIT

The control of tuberculosis in the individual is largely concerned with the control of the pulmonary cavity and thus the pulmonary cavity becomes a matter of great importance in connection with spread of the disease. Because of these two facts I have elected to bring my message to you under the title of "The Pulmonary Cavity and Its Control."

One gathers from the ancient medical writings that tuberculosis, as we now know the disease, has afflicted humanity since the earliest times. Always it has been recognized as a disease without geographic or racial limitations and one that attacked individuals of all ages and of every social station. Hippocrates (460-377 B. C.) had a profound knowledge of the disease, both clinical and pathological, as revealed by Adams' translation of his works. He recognized it as an epidemic disease and one of his contemporaries, Isocrates, considered it a contagious disease. Additions to the knowledge of the pathogenesis of the disease were made by Celsus (30 B. C.-50 A. D.), Aretaeus Cappadox (50 A. D.) and Galen (131-201 A. D.), but no new information was advanced for nearly eight hundred years, or until Rhazes or di Razi of the Arabian school built on the opinions advanced by Hippocrates and Galen. Dr. Sadi recently translated for me from a chapter on tuberculosis in the works of this Arabian physician and it was evident that the early worker had a keen appreciation of the symptoms of tuberculosis in its various stages and was familiar with the importance of cavitation, and hemorrhage as a complication of cavity.

Then two hundred more years elapsed before medical literature was enriched by writings on this disease. Maimonides (1135-1204) obtained knowledge of its pathological anatomy by studying animals slaughtered by Jewish people for food, but he made no original or especially valuable contributions.

It was not until late in the seventeenth century that the particular tuberculous lesion we are especially interested in was clearly recognized and described. Franciscus Deleuve Sylvius (1614-1672) was the first to describe ulceration of the lungs as due to suppuration of tubercles and thus to appreciate one of the methods or processes of cavity development.

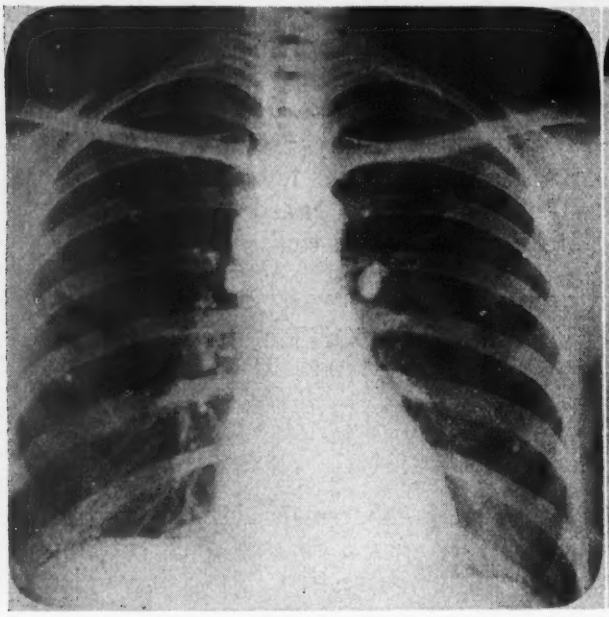
With the development of modern pathologic studies, knowledge of tissue change in tuberculosis rapidly accumulated and clinicians using the methods advanced by Auenbrugger in his work on "Percussion of the Chest" and Laennec on "Auscultation" were often able to determine during life of the patient the various stages and lesions of the disease. However, since intrathoracic tissue change has been so accurately recorded and revealed by satisfactory roentgen records, it

*This paper was presented before the Detroit Academy of Medicine. Surgery by Dr. E. J. O'Brien. Pneumothorax by Dr. R. C. Morgan.

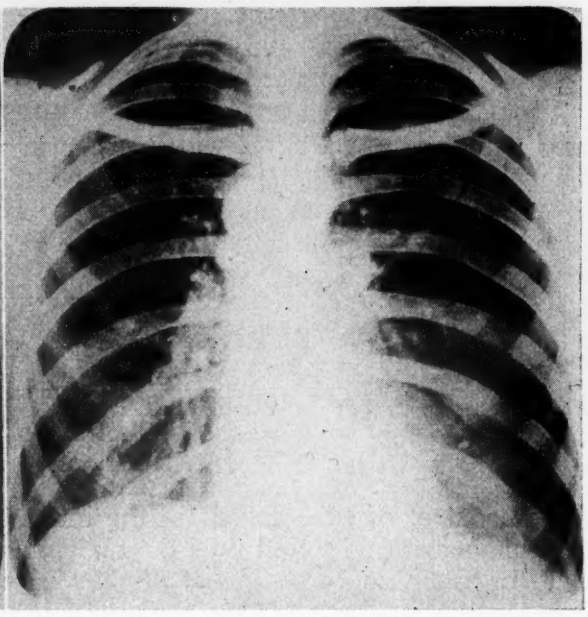
†Dr. Evans was graduated from the University of Michigan in 1902. After seven years of general practice he began the study of roentgenology in 1911, where he was associated with the late Dr. P. M. Hickey. He is a member of the Detroit Board of Health and for the past year he has been president of the American Roentgen Ray Society.

is evident that the former methods of determination of lung disease had serious limitations and that only comparatively gross lesions were detected by such examination.

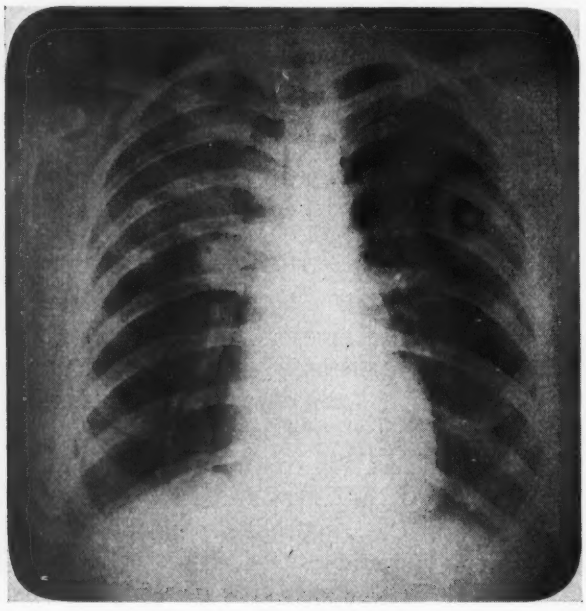
Cavity Development. To comprehend the process of cavitation, an accurate knowledge of tissue response to the tubercle itself or its products is necessary. These responses



Case 1, Fig. 1. Thin walled round cavity opposite left first interspace anteriorly. Lesion simulates "annular shadow." No perifocal reaction. Positive sputum.



Case 1. Fig. 2. Same as Fig. 1 nine days following increasing pneumothorax. Note change in position and contour of cavity. Lung about 50 per cent collapsed. Diagnosis of cavity confirmed by findings.



Case 2, Fig. 3. Early exudative lesion in upper right lobe, with beginning excavation. Early relaxation therapy for right lung paralysis indicated.

Thus Pinner and Douglas, of the Detroit Department of Health, studied a series of patients in the Maybury Sanatorium and by thorough physical diagnosis only seventeen per cent of cavities were recognized previous to a roentgen study.

are well described in Krause's book, "The Evolution of the Tubercle," as follows:

1. Proliferation—the essence of native tissue response.
2. Exudation—the essence of allergic response.
3. Necrosis—an anatomical end product of inflammation (exudation).
4. Fibrosis—an anatomical end-product of proliferation and also, no doubt, of the inflammation of allergy

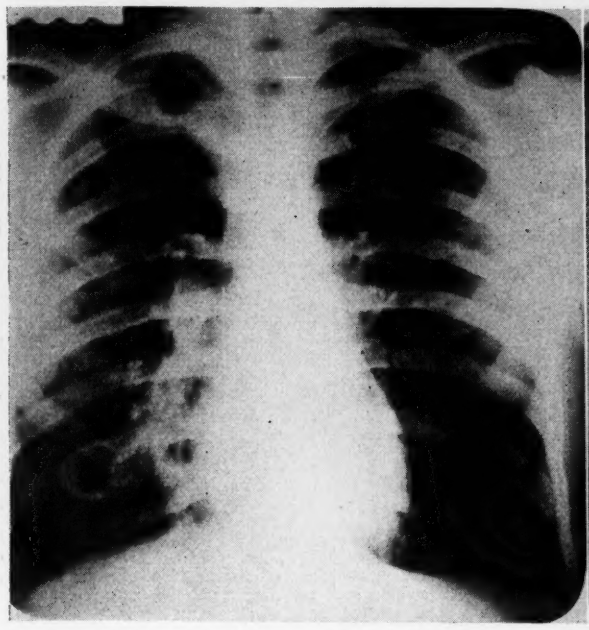
These several reactions have a characteristic appearance in the roentgen film and their recognition is necessary if one is to prognosticate the probable course and direction along which a given tuberculous reaction will proceed, and such prognostication is indispensable if the correct mode of treatment is to be selected.

It must not be assumed that these reactions occur or are found in a pure form in a given case or at a given time. Rather, usually all are present and in a state of contant change and it is by the inter-reaction of these processes that a cavity develops and that cavities are of variable size, form and type.

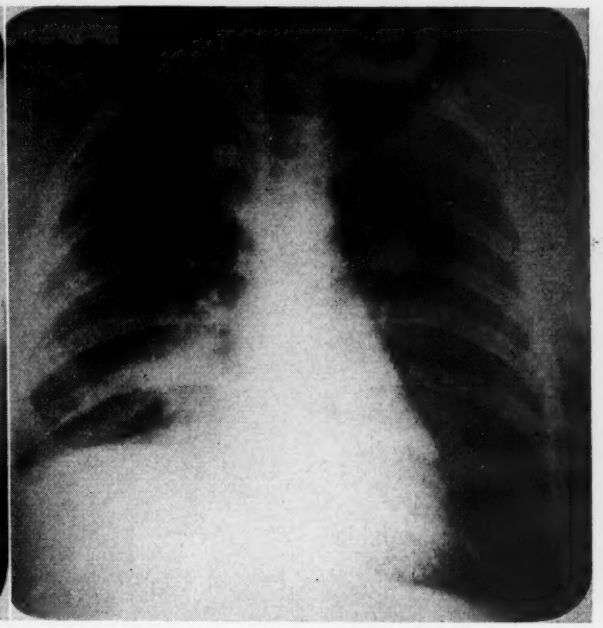
Cavities have been variously classified,

but it remained for Pinner to suggest a classification according to structural peculiarities roentgenologically recognized, this classification having prognostic and therapeutic application. He finds that all cavities can be grouped roughly under three types:

1. Round cavities.
2. Small multiple cavities.
3. Fibrotic irregular cavities.



Case 3. Fig. 4. Single moderate'y thick walled cavity in lower right. Normal level of right diaphragm.



Case 3. Fig. 5. Cavity closed by right phrenic paralysis. Note high position of right diaphragm.

1. The *round cavity* is always preceded by an infiltrative lesion, as a study of several roentgenograms will prove. This type of cavity results from a loss of tissue due to an exudative lesion in combination with the formation of a new cavity wall consisting of a thin layer of connective tissue fibers concentrically arranged. The regular form of these cavities is maintained by the new formed wall, and by the eccentric tension of the surrounding lung tissue.

The size of these cavities varies from one to eight or ten cm. The wall thickness is variable. With an extensive zone of reaction, further necrosis or liquefaction occurs with increasing size of cavity.

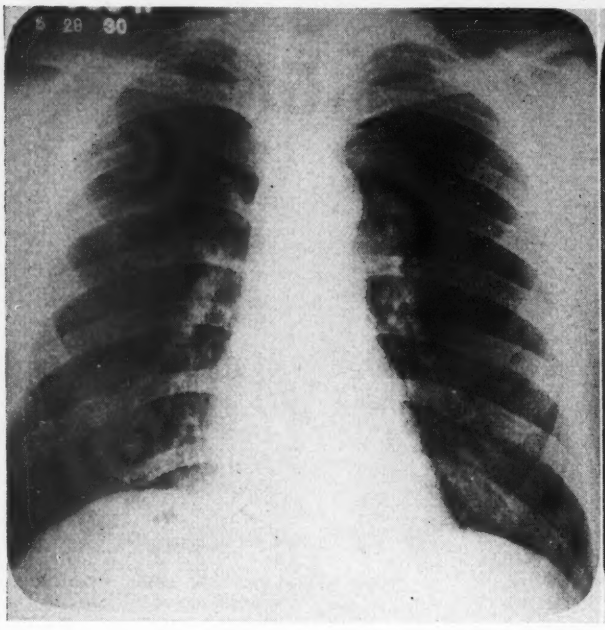
2. *Small multiple cavities.* This lesion is usually described in roentgen reports as "moth-eaten in appearance." The condition is one of numerous small cavities surrounded by an exudative process. Histologically the individual cavity represents a loss of tissue in an area of tuberculous bronchopneumonia, without a tendency to wall formation. These lesions may clear by resolution or by re-expansion of the lung if atelectasis be present, or extensive and rapid destruction may occur, resulting in larger cavities. In the case of small areas of involvement, a round or oval cavity may be the result.

3. *The fibrotic irregular cavity.* The roentgen appearance in this type is variable, depending on the size of excavation, extent of the zone of surrounding reaction and the degree of pleural thickening. The most important feature is the white line or band of dense tissue which forms part of the wall and which can be traced into the gross lung structure.

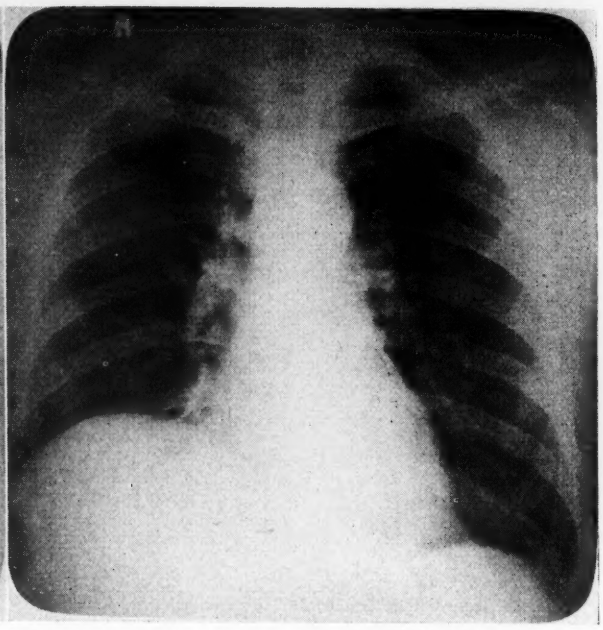
Period of Cavity Development. When the diagnosis of cavity was made by physical examination alone, it was the opinion that cavitation was a late manifestation of tuberculosis. Even now, according to the classification of the National Tuberculosis Association, the presence of a cavity is considered an indication that a case is far advanced. Roentgen studies have taught us that excavation of a tuberculous lesion is a very early process, probably occurring at times within two weeks following the primary pulmonary consolidation. Further, that extensions of the pulmonary involvement and additional cavity formation may be attended with symptoms not more serious than a "common cold." It should be emphasized that these early formed cavities are of

the "round" type; naturally more time is required for the development of fibrous walls.

Differential Diagnosis. It would seem that the recognition and classification of cavities would present no difficulties. Yet on "The Significance of Annular Shadows on Chest Films." We believed that such markings represented local pleural proliferation. We now know that many, if not all, of the so-called annular shadows are true cavities.



Case 4, Fig. 6. Thin walled cavity in right mid lung field.



Case 4, Fig. 7. Closure of cavity by phrenic neurectomy. Note elevation of right diaphragm.

such is not the case. Careful study of stereoscopic films made at various angles, and the patient in several positions, may be required, because the normal lung markings or exaggerated markings may so produce shadows on the films that cavity is simulated.

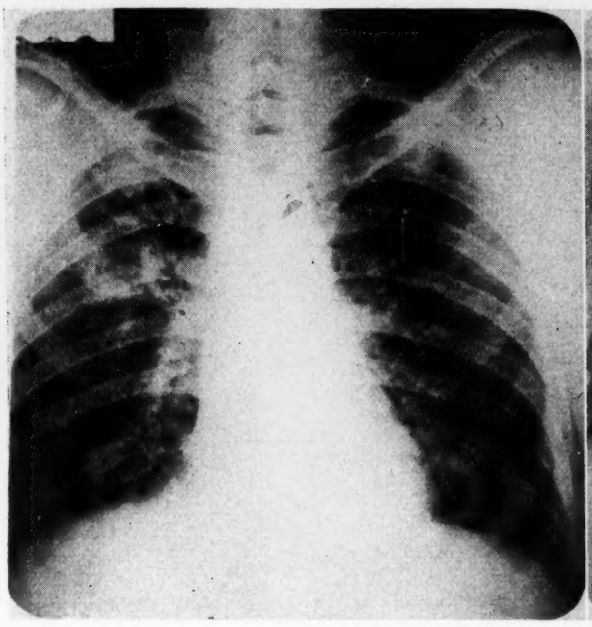
And again, the presence of thickened pleuræ may entirely obscure the underlying lung detail, or fluid in the pleural cavity will act in the same manner. Further, there is a type of pulmonary disease characterized by extensive lung consolidation and a paucity of symptoms. In this, large areas of the chest show uniform clouding, or a small area of consolidation may rapidly extend, so that within a few days an entire lobe may become involved. It has been observed that these lesions undergo irregular resolution or absorption and if this process or these processes occur in the center of the lesion, an appearance of cavity formation results. This misinterpretation may have serious consequences, for radical treatment may be instituted instead of the conservative bed rest and supportive therapy indicated.

Some years ago I was guilty of presenting a paper before a group of roentgenologists

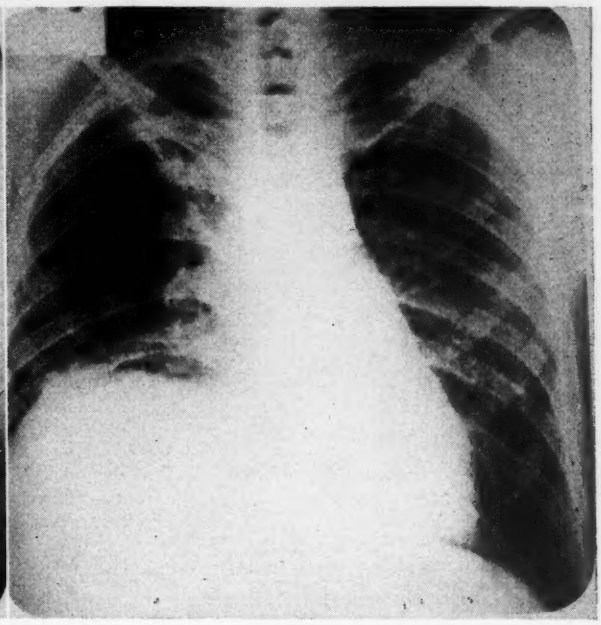
Mutation in Size and Position. In the communication on annular shadows above mentioned, one of the arguments supporting our contention that these did not indicate cavitation was that they developed too quickly and that their position changed from time to time. Greater experience, keener observation and better judgment tell us now that all of these conditions are observed as features of true cavity and that they are dependent on various factors, such as the elasticity of the lung tissue, accommodation of the intrathoracic structures to varying pressures, and varying degrees of atelectasis and other conditions, such as traction from fibrous tissue and adhesions.

Distribution of Cavities. Sweaney, Cook and Kegerreis of the Research Laboratories of the Municipal Tuberculosis Sanitarium, Chicago, recently made a study of 2,204 patients, 1,209 of whom had cavities. Of these, 268 cavities were of such nature that they could be actually measured and localized. This study determined that the distribution of the lesion on the right and left sides appeared to be directly proportional to the lung volume of the respective sides, that

they were mostly distributed in the posterior and outer part of the upper lobes and apices of the lower lobes and situated from 1.5 to 3 cm. beneath the pleura corresponding to the fourth and fifth order of bronchi. Thus the lesions were practically all "infraclavicular." They further observed that about 98 per cent were situated on bronchi that are directed sharply posteriorly. They concluded that the position of the early cavities indicated a common mechanical factor of origin, suggesting a bronchogenic spread resulting from "a lack of clearing facilities" of the particular bronchi.



Case 5, Fig. 8. Multiple cavities in right upper lobe, with irregular walls and perifocal reaction.



Case 5, Fig. 9. All cavities closed as a result of elevation of right diaphragm induced by phrenectomy. Cases 3, 4 and 5 prove that cavities at any level can be controlled by phrenic paralysis.

Importance of Cavities. Numerous and extensive studies have been made in an effort to evaluate the clinical and prognostic significance of cavities, and the conclusions are not in accord. While all appreciated that these lesions indicated advanced disease and that they required active treatment, they apparently did not comprehend the rôle the uncontrolled cavity played in reinfecting the patient, either by bronchogenic, lymphogenous or hematogenous spread; nor did they realize that the uncontrolled cavity rendered the carrier an active spreader of the disease to others. Even some recent workers have attempted to minimize the importance of cavities, basing their claims on the number of small cavities apparently closing under bed rest treatment alone. These writers have not taken into account the fact that they were working with a selected group and that a prolonged hospitalization was required; neither did they anticipate the large number of cavities that would recur when the patients were returned to active life.

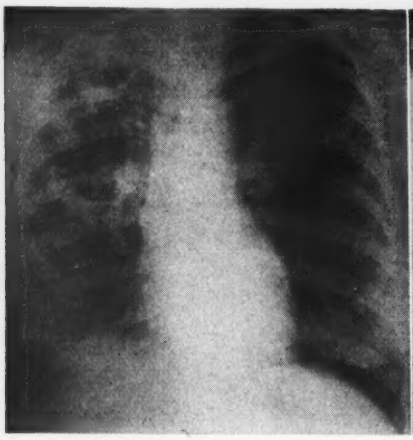
An additional hazard from cavity is the association with hemorrhage, either repeated or massive. Still another danger is the possible rupture of the cavity into the pleural sac with resulting empyema; also considerable morbidity results from secondary infection of the cavities with the more virulent microörganisms.

Methods of Healing Cavities. Dutcher, in a communication to the Medical and Surgical Reporter of Philadelphia in 1864, preliminary to the reporting of a case of cavity healing, discussed the subject of the healing of tuberculous cavities under four subheads:

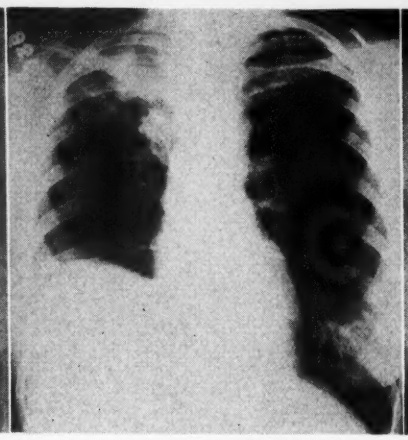
1. The possibility of healing.
2. The mode in which tubercular cavities may heal.
3. A large cavity more apt to heal than small ones.
4. Therapeutics for the healing of tubercular cavities.

1. This writer had knowledge of pathologic findings, being familiar with the teachings of Bogle, Laennec and Louis, who held that cavities in tuberculosis may heal spontaneously and that many healed cavities

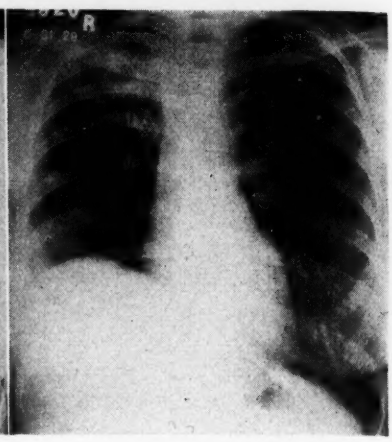
were found in patients dying from tuberculosis. They also observed that in the same patient cavities in all stages of development, formation and healing could be found. Dutcher decried the custom of offering no hope to the patient with a diagnosis of cavity, the then so-called third stage.



Case 6, Fig. 10. Multiple cavitation in upper right. Note varying sizes and thicknesses of walls and marked perifocal reaction.



Case 6, Fig. 11. Results of phrenic paralysis one year following operation. Note single small cavity remaining.



Case 6, Fig. 12. All cavities controlled after three years.

2. This writer was apparently familiar with the detailed course of tuberculous lesions, knowing that there could be complete resolution of such lesions without fibrosis, or that healing of lesions occurred by fibrosis and later absorption, or, lastly, that certain lesions healed by cavitation. He described the three modes in which the healing of a tuberculous cavity may be effected:

(a) The cavity may remain open, the surface being lined with a thin layer of plastic lymph which adheres to the surrounding structures, gradually organizing and finally being converted into a membrane which shields the cavity and prevents its further extension.

(b) Healing may be effected by the contraction of the cavity as a part of the fibrosing process, the slow and steady agglutination of its walls by the intervention of dense cellular substance of new formation.

(c) By an effusion of coagulative lymph or by repeated deposition on the inner surface of the cavity wall which gradually obliterates the cavity by organization.

3. As regards Dutcher's contention that a large cavity had a more favorable prognosis than a small one, the arguments advanced were not convincing. It is evident that he was confusing various stages of the disease and various types of the disease and that he did not have full knowledge of cavity variation.

4. Under therapeutics he held that certain drugs were specified to a degree and claimed value for cod liver oil, iron, iodine, bromine and quinine. Also he stressed hygienic regulations.

At this early period, none of the mechanical, physical or anatomical factors favoring cavity healing were known other than the advantage of rest.

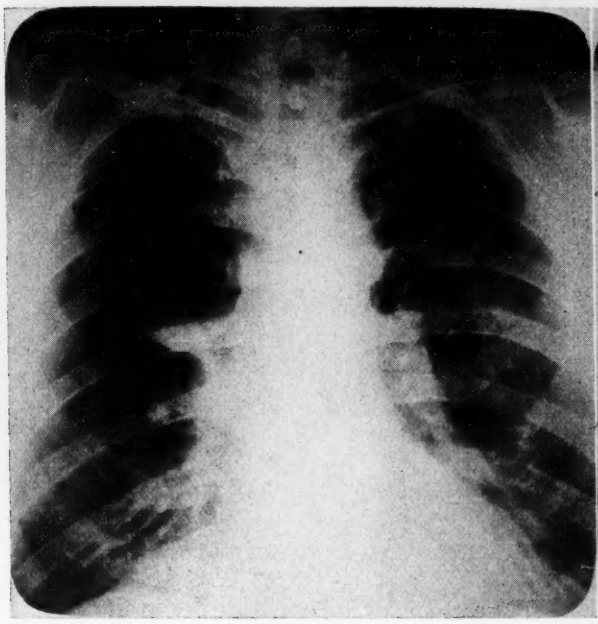
Treatment of Cavities. The earliest writings describe operations or procedures dealing with conditions within the chest considered to be cavities but such descriptions indicate to us that empyemal cavities or localized destruction associated with pulmonary abscesses were being dealt with.

It is less than a hundred years since the first attempt was made to treat lung cavities of tuberculous origin by accepted surgical means. Mosler of Greifswald, Germany, apparently is entitled to the credit of being the first to consider or suggest such treatment. Reasoning from the experience gained in treating external ulcers he decided that a similar internal lesion would respond in a like manner. Accordingly he opened and drained a superficial consumptive cavity using a silver drainage tube through which to make his applications.

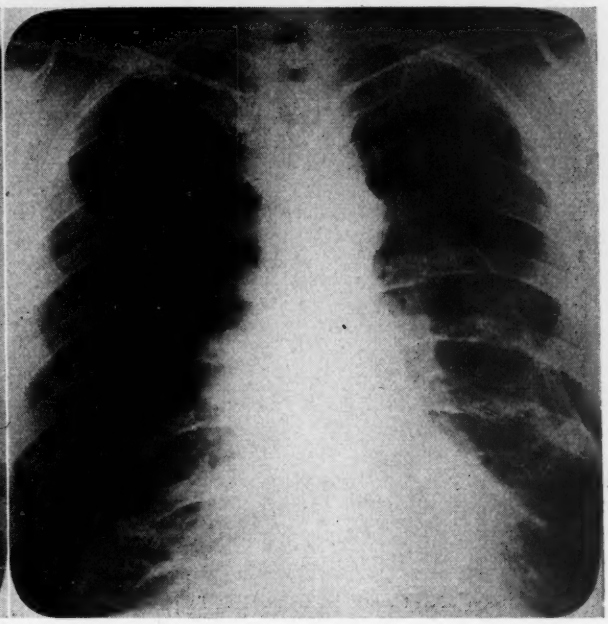
It is interesting to note that at this early time the association of cavities and pleural adhesions was recognized and the danger of the development of a pyopneumothorax from communication with the pleural cavity

was appreciated. While no favorable results were obtained in the treatment of cavities of tuberculous nature, the method was later adopted for the treatment of cavities of acute infectious origin with success.

(3) The more recent methods proposed.
(4) The dangers and disadvantages of such treatment.
(5) The clinical results of this mode of treatment.



Case 7, Fig. 13. Bilateral cavities in partially collapsed lungs. Pneumothorax only. Note large cavity in upper right.



Case 7, Fig. 14. Increasing pneumothorax with complete cavity control. In spite of extreme collapse of lungs, vital capacity is well maintained.

Christian Fenger and J. H. Holliston of Chicago reported such method of treatment in detail in an article published in the American Journal of Medical Sciences in 1881, October, page 370, and by so doing established a method which has been continued in use to this time.

In an earlier issue of the American Journal of Medical Sciences (October, 1874, p. 313) is found a contribution by William Pepper, Clinical Professor of Medicine in the University of Pennsylvania, entitled "On the Local Treatment of Pulmonary Cavities by Injection through the Chest Wall." Simultaneously with Mosler of Griefswald (previously mentioned), but independently, Pepper conceived the idea that benefit would follow direct local treatment of pulmonary cavities. While he considered this method as early as 1867, it was not until February, 1874, that it was actually practised. In this communication, Pepper discusses

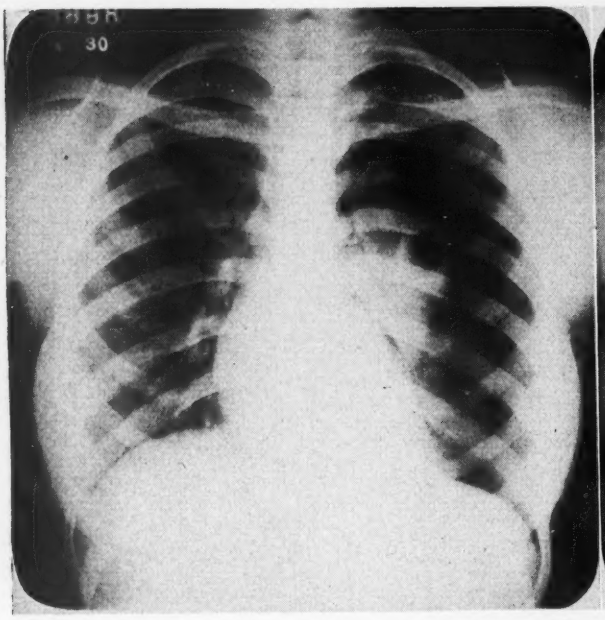
(1) The history of the direct local treatment of pulmonary cavities by thoracentesis.
(2) The indications it is designed to meet.

It is Pepper's contention that though there is conclusive evidence that Hippocrates, Galen, Rhazes and other earlier physicians performed the operation of thoracic paracentesis, the conditions treated were probably empyemal or pulmonary abscesses rather than cavities associated with tuberculosis. The clinical histories of such operated cases positively support this contention. This procedure was apparently entirely neglected in the middle ages and it was not until 1696 that Baglive described an operation he had seen done in Padua seven years previously in which the thoracic cavity was explored through an incision between the ribs six fingerbreadths in length. He speculated with the following language: "A phthisick arising from an ulcer is commonly branded as uncurable upon the plea that the ulcer is internal and occult, and cannot be cleaned like other external ulcers. But why do they not make it their business to find out the true situation of the ulcer and make an incision accordingly between the ribs, to the end that proper remedies may be conveyed to it?"

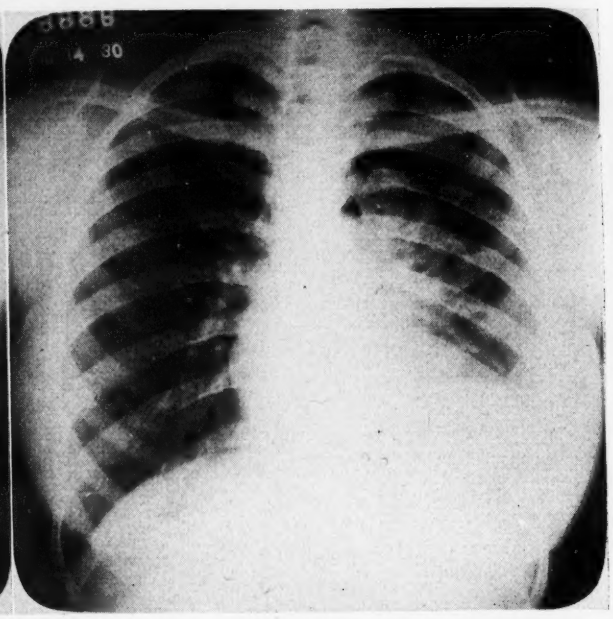
In 1727 a much more valuable contribu-

tion to the subject was made by Barry (Treatise on Consumption, 2nd Edition, London, 1727, page 267). In this article the anatomical relations of phthisical cavities were described, special mention being made of pleural adhesions as a result of which the cavities could be incised without danger. As one of the advantages of surgical exposure Barry adds that "the ulcer may be more easily cured by deterging and healing injections."

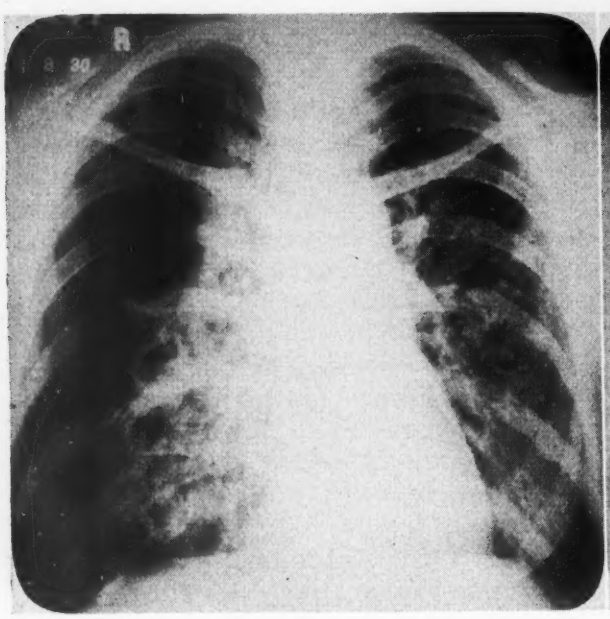
But as stated previously the description of the cases and the operative findings suggest that none of these cases represented an opening of a true tuberculous cavity. Pepper records several other references to this procedure during the early nineteenth century but is impressed by "the almost entire failure of this operation to attract even the criticism of eminent observers." However, he made a wise observation when he wrote that "the method was probably condemned



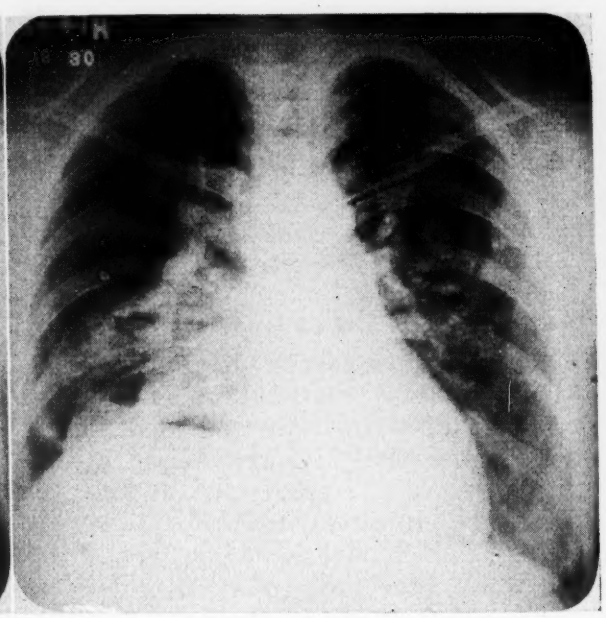
Case 8, Fig. 15. Cavity in upper left lobe not controlled by continued pneumothorax.



Case 8, Fig. 16. Cavity completely controlled by paralysis of left diaphragm.



Case 9, Fig. 17. Multiple cavities in right lung not controlled by pneumothorax. Active lesions in contralateral lung.



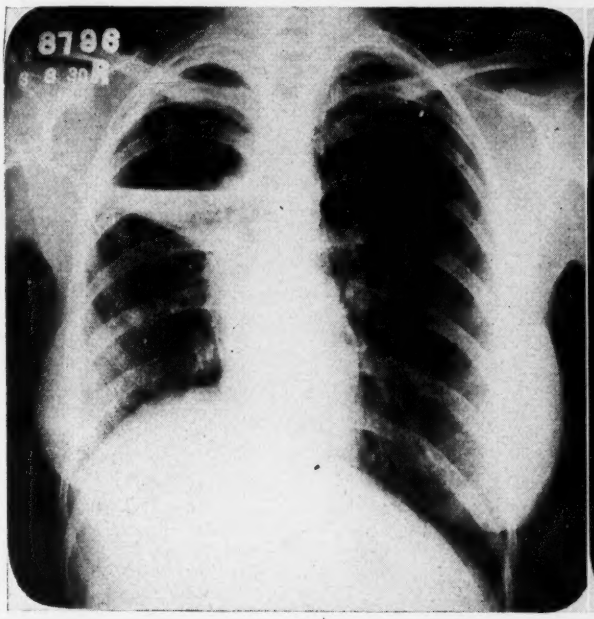
Case 9, Fig. 18. Control of all cavities by induction of right phrenic paralysis. Lesions in left lung show improvement.

by medical pathologists on the ground that it was directed only against a local expression of an incurable constitutional disease."

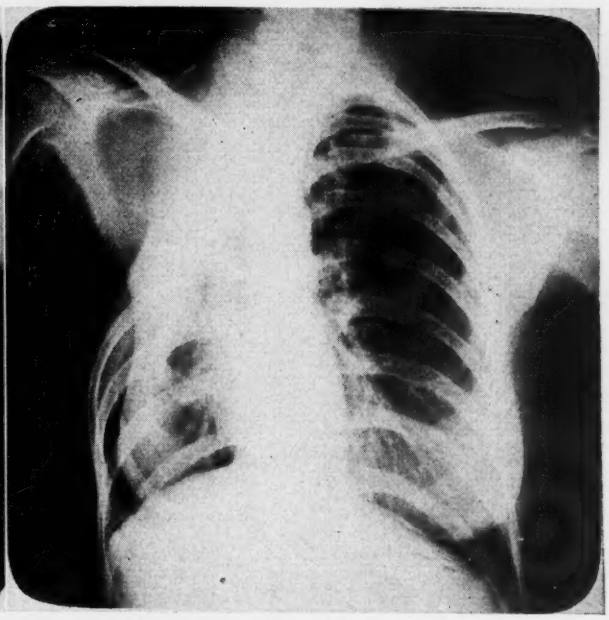
Pepper appreciated the clinical and prognostic importance of cavity, for, in 4,530 cases he had studied showing cavity, only 81 seemed progressing toward a cure of cavity —1.8 per cent. He also knew the dangers of cavity as the risk of hemorrhage, the danger of the development of miliary tuberculosis; also that the presence of the cavity was usually associated with severe clinical symptoms.

By the local treatment of cavities he hoped to establish drainage, thereby lessening irritation and associated cough, cleanse the cavity, increase rest for the tissues about the cavity with resulting tendency to scar formation and prevention of cavity extension.

The method involved the use of freezing as a local anesthetic, the introduction of a

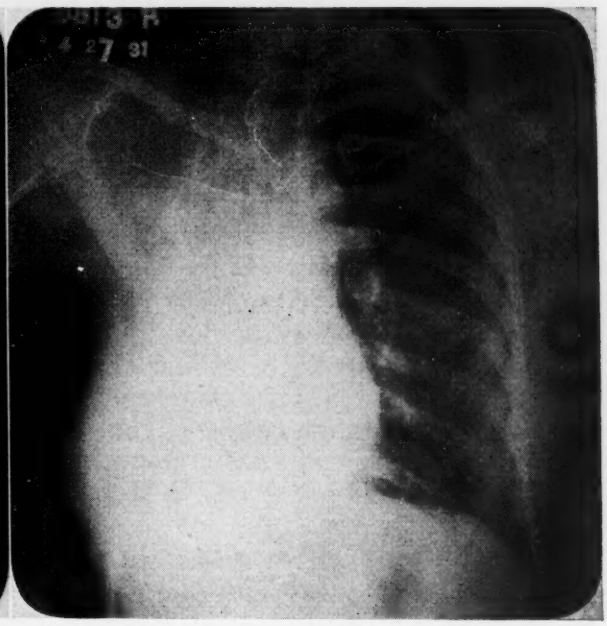


Case 10, Fig. 19. Large, poorly drained cavity in upper right, not controlled by phrenic paralysis and collapse not obtained by pneumothorax.



Case 10, Fig. 20. Complete control of cavity by upper stage thoracoplasty.

Case 11, Fig. 21. Upper stage thoracoplasty with pathological lung tissue remaining in lower right.



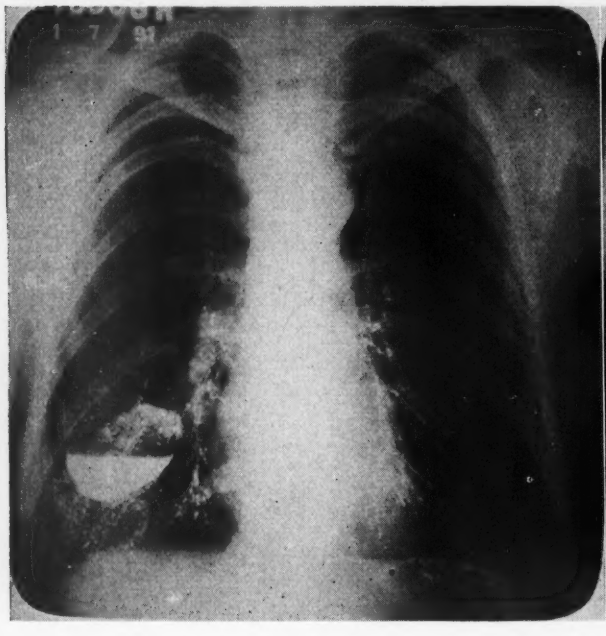
Case 11, Fig. 22. Complete right thoracoplasty, with full control of right lung lesions.

small cannula and the injection of a weak iodine solution—5 to 25 minims—once a week.

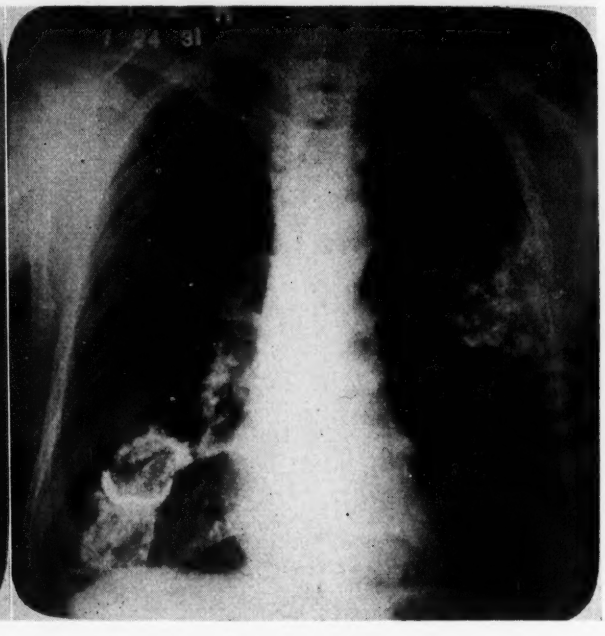
Clinical observations and post-mortem studies convinced Pepper that the mode of treatment had no disadvantages and that no complications developed. He concluded that in several cases the general symptoms were lessened and in one case he considered the treatment had brought about a healing of the cavity walls with fibrosis and contraction. But Pepper was not permitted to practice or advocate such methods without criticism. James H. Hutchinson, in an original communication entitled "The Local Treatment of Pulmonary Cavities by Injection through the Chest Walls" published in the Medical Times, Vol. IV, May 30, 1874, page 548, makes an effort to show that Pepper's method had no originality and possessed no value. He gave a more complete history of operative procedures and reasoned from a pathologic basis how these were doomed to failure.

Modern Control of Cavities. No attempt is to be made to discuss in a historical sense the surgical procedures constituting modern treatment. Their introduction and development are relatively recent and generally well known and understood. However, their application is undergoing change and advancement and this phase will be presented as the paper proceeds.

The aim and purpose and intent of all of the agencies is the reduction in the volume of the pathological lung, a condition favoring or necessary to lung healing. By the use of artificial pneumothorax the lung volume is reduced without any appreciable change in the capacity of the thoracic cavity.



Case 12, Fig. 23. Cavity in lower right visualized by introduction of radio-opaque oil.



Case 12, Fig. 24. With patient treated by position favorable for cavity drainage oil has entered terminal bronchus in base of upper left lobe, thus demonstrating method of bronchogenic spread.

By virtue of the elastic quality of the lung and the negative pressure in the thoracic cavity, the lung volume is lessened by relaxation or collapse as the degree of negative pressure is reduced by the injected air. The lung volume can also be lessened by reduction in size of the thoracic cavity and this can be brought about by three methods —either temporarily or permanently by phrenic crushing or phrenic neurectomy, or by the varying degrees of resection of the ribs permitting collapse of the thoracic wall, or, thirdly, by the establishment of positive pressure in the thoracic cavity. This positive pressure may be obtained by the injection of air under pressure or by the introduction of some material that can be expanded, between the diseased lung and the thoracic wall.

It should be stated that a reduction in the size of a thoracic cavity may be brought about by a shifting of the mediastinal con-

tents. This method is used to equalize pressure in the event that tracheal or cardiac displacement is productive of important symptoms.

The quality and the extent of the disease in a given lung will determine whether one or more of the procedures will be employed. It is relatively rare that pneumothorax alone will suffice. And it should be interjected here that the minimal use of all methods is the ideal practice—that no lung should be permitted to collapse except to that degree required for obliteration of the cavity and for bringing about a negative sputum; or that rib resection will be limited in extent and location to the degree necessary to make sufficient compression to control cavity and sputum. In all cases other than the minimal, pneumothorax should be combined with phrenic neurectomy. The reduction in lung volume by diaphragm elevation may or may not be necessary to bring about cavity and sputum control, but in any event the lung impaired by the lesion needs the protection against recurrence afforded by the phrenic paralysis.

The procedure of rib resection or thoracoplasty is indicated when the less radical methods fail. It should be emphasized that this operation is never undertaken until pneumothorax has been accomplished, or, if not accomplished, that pleural symphysis be proved by repeated and thorough attempts at air injection. And further, all thoracoplasties must also be preceded by the surgical paralysis of the diaphragm.

It would seem that intelligent and successful management of lung lesions by surgical means is quite impossible without the guidance afforded by roentgen studies. It is therefore incumbent upon the roentgenologist that he be able to interpret lung shadows in pathological, clinical and surgical terms. Lacking this ability, he will deprive many patients of their opportunity for improvement or recovery by failure to provide the clinician or surgeon with information necessary for proper handling of the case.

To return directly to our subject, neither pneumothorax nor phrenic paralysis alone or in combination will bring about obliteration of all cavities. This failure of cavity collapse may be due to three conditions: pleural adhesions, pulmonary consolidation or a greatly thickened or very firm cavity wall.

In the event that adhesions are present, preventing approximation of cavity walls, pneumothorax should be persisted in or positive intrapleural pressure be applied for periods of six or eight months, providing there are no indications for more active therapy, such as severe hemorrhage, extending lesion or enlarging cavity. Patience in this regard will greatly reduce the number of patients subjected to the more serious and difficult intrathoracic operation of adhesion section. Illustrating this point, of 250 patients under pneumothorax treatment and presenting adhesions, only six failed to have their cavity controlled and became indicated for pneumolysis. Should it become necessary to sever the adhesions, however, two methods are available, one the closed or so-called Jacobean's method which involves the passing of two tubes into the thorax, one to carry illumination and the other for instrumentation, and the open method which was developed by our colleague, Dr. O'Brien. In this method the adhesion bands are exposed through a very small opening and operated on with the advantage of direct vision, thus permitting refined surgical technic.

Contraindications to Surgical Measures. Early in the development of these methods, patients presenting bilateral lesions were considered unfavorable but gradually the various procedures have been tested and it is now known that disease in the contralateral lung does not render the case inoperable. On the contrary, it is frequently observed that control of an advancing lesion in one lung will have a most favorable influence on a lesser lesion in the opposite lung. The tendency to include more and more cases in the operable group and the tendency to multiple procedures in a single case have advanced to where a patient with relatively advanced bilateral disease will be the subject of bilateral pneumothorax, bilateral phrenic neurectomy and limited bilateral thoracoplasty. Thus the contraindications would be confined to the far advanced or hopeless bilateral cases or those having other foci of involvement, and even then great caution should be taken before so classifying a patient.

Comparative Results. Numerous statistical studies have been made to determine the advantages, if any, of this active and apparently radical treatment over the more conservative methods of rest and support and in every instance the figures indicate the

great superiority of the new methods. For instance, Barnes and Barnes followed 1,454 cavities in a Rhode Island sanatorium and observed a mortality of eighty per cent within one year and ninety per cent within five years, and an average life duration of only 15.8 months. Springman studied 626 cases occurring in industrial laborers over a period of sixteen years and found a total mortality of 78.2 per cent and a 61.7 per cent death rate for the first two years. Of the small group remaining, 69.1 per cent were totally or partially disabled and only 4.1 per cent of the whole number were working. Contrast this with Newberger's smaller group of 86 engaged in trades and labor, of whom 61.6 per cent were able to work, only 21.0 per cent were incapacitated and but 17.8 per cent had died.

In our own service, Werner and O'Brien made a comparative study with the results similarly favoring modern treatment. Further proof, if necessary, could be furnished from the statistical reports of the William H. Maybury Sanatorium and the Herman Kiefer Hospital. The percentage of patients discharged as cured or arrested had increased from 8.1 per cent in 1927 to 34.1 per cent in 1931 and the reduction in the death rate has been equally satisfactory, at the Maybury Sanatorium from 25.8 per cent in 1927 to 10 per cent in 1931 and at Herman Kiefer from 35 per cent in 1927 to 21 per cent in 1931.

Conclusions. While there are many factors influencing favorably the death rate from tuberculosis, one must conclude that early case finding, early hospitalization and the early institution of active surgical methods are responsible for the excellent record in Detroit and Wayne County. Furthermore, the successful treatment of tuberculosis has become one of surgical procedure rather than medical. At least the medical treatment simply supplements the surgical procedures.

DIAGNOSIS OF EARLY TUBERCULOSIS IN THE STRICT SENSE OF THE WORD*

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The diagnosis of early tuberculosis has been talked and written about since the early part of the twentieth century. In fact, it has been one of the goals at which the workers have aimed, since, if tuberculosis could be diagnosed early, the focus of infection could be stopped, the ultimate prognosis of the case could be improved by the institution of treatment immediately, and the duration of treatment shortened, generally speaking. At one time, we spoke of incipient tuberculosis; in fact, in classifying the disease into stages provision was made for the so-called incipient case. At a later time, attention was called to the true meaning of the word incipient, and the fact was pointed out that by our methods of examination at that time we never detected the disease in its incipiency. Then the word minimal was substituted for incipient, the thought being that minimal tuberculosis was about the smallest amount of disease that could be demonstrated by methods then extant. But the term early tuberculosis brings the time element into the picture and our methods are now sufficiently refined so that tuberculosis can be diagnosed early in the strict sense of the word.

At one time we relied a great deal upon symptoms and physical signs, particularly râles persisting after cough, in the diagnosis of what we called early tuberculosis. It is not so long ago that finding tubercle bacilli in the sputum in many cases was thought to be an early manifestation of the disease. Careful observation and study has shown that in the vast majority of cases one cannot depend upon any of these for the diagnosis of early tuberculosis in the strict sense of the word. We know now that the disease may exist months and years, all the time

*Presented before the 111th Annual Meeting of the Michigan State Medical Society at Pontiac, Michigan, on September 24, 1931.

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progressing slowly but surely without causing a single symptom. We also know that the disease may be present in a considerable part of one or both lungs and yet by our methods we are unable to elicit a single abnormal physical sign. Moreover, we know that the disease often exists over a considerable period of time before the lesions break down the tissues, ulceration occurs, and tubercle bacilli are discharged into the bronchi or their ramifications, resulting in sputum positive for tubercle bacilli. Only about one in three of the patients with demonstrable minimal tuberculosis have tubercle bacilli which we can demonstrate in their sputa. Therefore, we were compelled to look for more refined methods of detecting early tuberculosis.

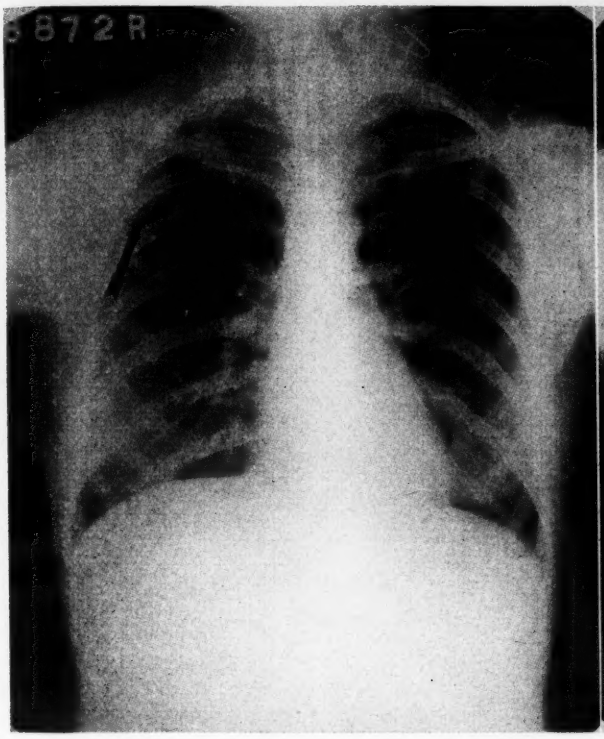

Fig. 1. Made from an X-ray film taken on September 4, 1929, of the chest of a hospital intern who had been negative to the tuberculin test. Following exposure to tuberculosis the tuberculin test became positive and the lesion in the right second interspace appeared on the X-ray film.

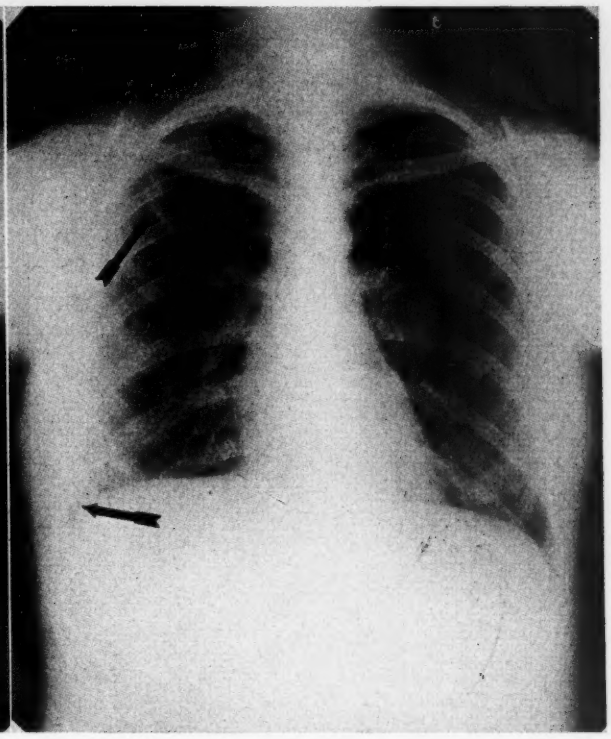

Fig. 2. Made from an X-ray film taken on May 4, 1931, of the same chest as seen in Figure 1. Pleural effusion appeared since the last film was made but has already absorbed. There is some thickening of the pleura at the right base with partial obliteration of the right costophrenic angle. In the right second interspace, partially hidden by the second rib, one sees the tuberculous lesion, which we believe to be the first infection or childhood type of tuberculosis.

The tuberculin test after shifting from one part of the stage to another has recently developed into the most important factor in the diagnosis of early tuberculosis. Sir Robert Philip, a pioneer in serial tuberculin testing, gave us some of the most valuable fundamental principles that have ever been known in tuberculosis control. Every physician should read the recent summary of Sir Philip's work in the British Medical Journal, January 10, 1931, and should apply his measures in every age period of life. He says, "Continued observation of the natural history of the infection, the lessons of experiment, and the facts of comparative pathology—for example, tuberculosis as it occurs in cattle—together with the introduction of tuberculin tests, have made possible a truer perspective.

"The gradual dissemination of tuberculous infection and the resultant disturbance have been followed from the point of infection through the lymphatic system to involvement of the various viscera. The march of events may be readily studied in animals, when inoculated either naturally or artificially. In the human subject, it is one of the privileges of age to have had the opportunity time after time of watching the procession of events in the same individual from the date of initial infection and trifling manifestations, through the varying phases of the infected individual's life. It has been possible for me in numerous instances to trace the development of tuberculosis in the

same subject in ever-changing form, from the seed stage up to full fruition, in some instances for thirty years or more."

Again he says, "Having regard to the

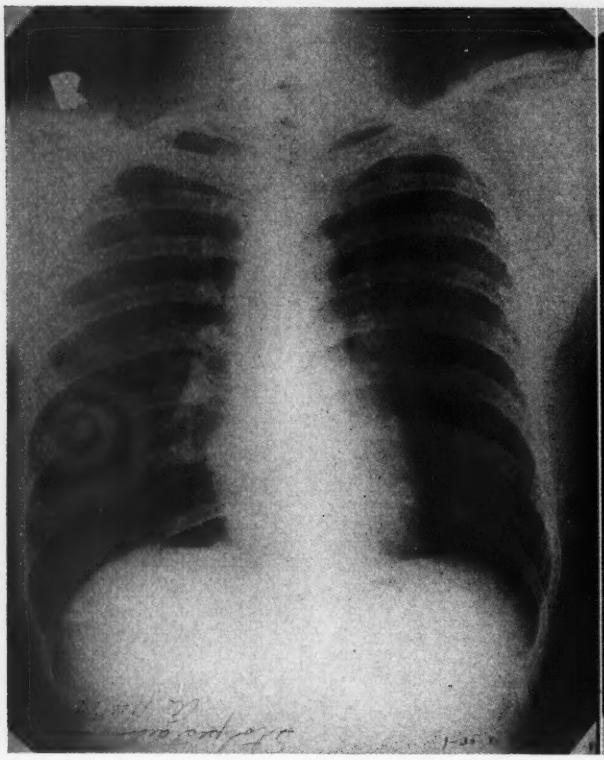

Fig. 3. Made from an X-ray film taken on January 30, 1931, of the chest of a sophomore medical student whose tuberculin test was negative a year before. This student was exposed to tuberculosis in the winter and spring of 1931. In January, 1931, the tuberculin test was markedly positive, but this film shows no evidence of tuberculous disease. In other words, the tuberculin test was the first manifestation of its existence.

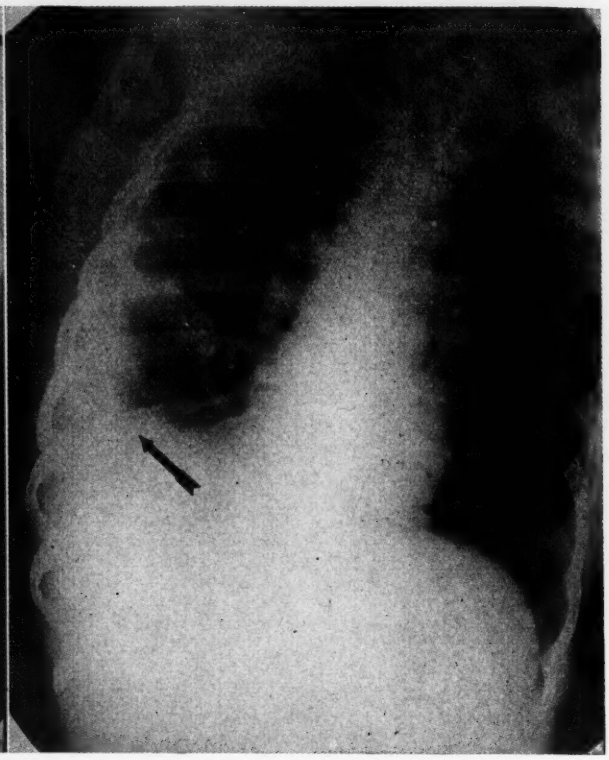

Fig. 4. Made from an X-ray film taken on May 11, 1931, of the same chest as seen in Figure 3. In the third interspace on the right side near the periphery, one sees slight infiltration. By special X-ray technic a fluid level is demonstrated on the right side.

likelihood of infection in the course of childhood, and the difficulty of assessing the ultimate consequences of such infection, I am firmly convinced that the general use of tuberculin as a diagnostic agent in childhood is most desirable. Because of the likelihood of infection, the tuberculin test should become routine practice at stated intervals from early infancy onwards. The procedure is painless and harmless; yet the knowledge obtained by it is priceless.

"So long as the reaction remains negative, nothing further is necessary. Whenever a positive reaction is obtained for the first time, the fact and the date should be recorded. The fact of tubercularization, and the date of its first detection, are of immense significance in the life-history of the child, having regard to the possible implications."

Had the work of Sir Philip been taught in every medical school, we would be much further in early diagnosis work since we would not have to break down the misinformation which exists in the minds of many physicians that approximately 100 per cent of young adults react positively to the tuberculin test. Although this has been disproved over and over, it is not an uncommon experience to read in current literature that nearly everyone has had a "touch" of tuberculosis. One finds it in magazines, in recent textbooks for medical and nursing students. The old statement that it requires ten years to get newly established facts incorporated in our textbooks is true except that it takes longer with tuberculosis.

Much of the work of the veterinarians, the physicians, the nurses, and closely allied health workers has borne fruit so abundantly that now in many parts of this country, the first infection from tuberculosis is received by individuals in adult life. Tuberculosis has been completely eradicated from the cattle herds of whole counties in some parts of the country. Even among human beings, where the problem is far more difficult, there are places where it has been re-

duced to such a low percentage that even the most enthusiastic workers can hardly believe the facts. The fewer the number of foci by way of open cases in a community, the simpler the problem becomes. One can even conceive of adults today living out the natural span of life without having been infected with tubercle bacilli. This is the goal toward which we should strive for everyone of the future generations.

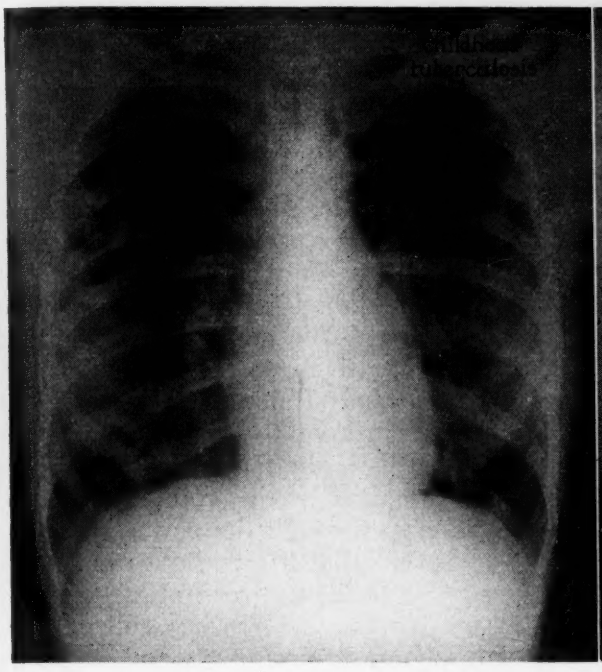

Fig. 5. Made from an X-ray film taken on May 14, 1928, of the chest of a girl of thirteen years. She had been exposed over a long period of time to a sister suffering from tuberculosis. This film shows the childhood type of tuberculosis in the left lung and hilum.

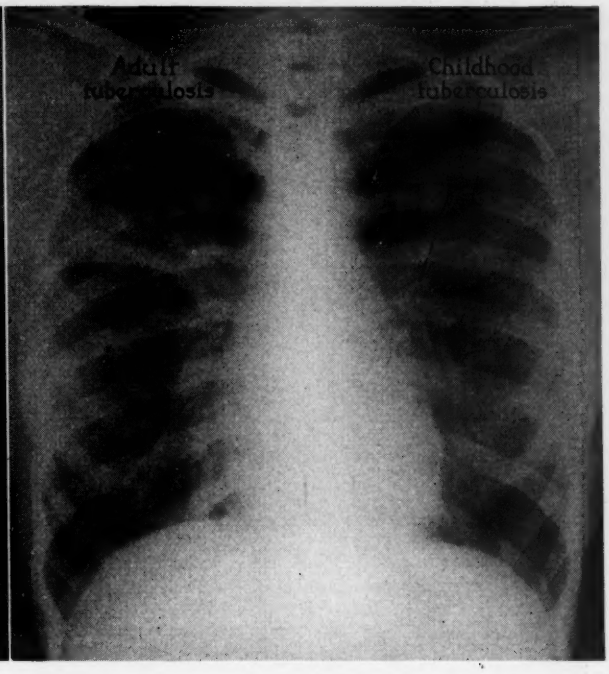

Fig. 6. Made from an X-ray film taken on August 26, 1930, of the same chest as seen in Figure 5. In addition to the childhood type of tuberculosis previously seen in the left lung there now appears the adult type in the right lung.

Despite the fact that there has been some opposition to the use of the tuberculin test as a specific diagnostic measure, the truth has it that tuberculin is highly specific and is the most dependable diagnostic measure now in existence. The tuberculin test, like other biological tests, is not 100 per cent perfect, but of all the tests it is probably nearest to perfection, and hence, deserves the full confidence of the health workers who use it. Research is still being carried on to further improve tuberculin. When applied by a trained person, it has no possibility of doing harm immediately or remotely to the individual to whom it is administered. Statements now appearing in open letters to newspapers, magazines, et cetera, to the effect that tuberculin administered to cattle affects their offspring or that it carries living tubercle bacilli to their bodies or that the milk of these cattle will harm the babies who drink it are all from ignorant or misdirected minds.

The initial tuberculin test is our first step in the diagnosis of early tuberculosis in the strict sense of the word. It tells us when tuberculosis is present before any other phase of an examination is of any avail. When a physician sees a patient for the first time and applies a tuberculin test and finds it positive, if he is well informed on tuberculosis he knows that somewhere in that person's body is a focus of tuberculosis. He does not know how long the focus has been there because previous tests have not been made. Likewise, when he takes a history he may or may not obtain evidence of symptoms, such as cough and expectoration or those resulting from toxemia. If he does, all the information that he has is when these symptoms began and that information tells him practically nothing about the time the lesion developed. It is now a well established fact that a tuberculous lesion may be present for years before the slightest symptom appears and throughout those years it may have been progressing. In fact, the disease may have become quite advanced before any symptom appeared. When the physician makes the physical examination,

he may or may not elicit signs which lead him to believe that minimal tuberculosis is present. If he does, these signs give him no worth while evidence as to how long the lesion has been present. He does not know when the signs appeared nor does he know

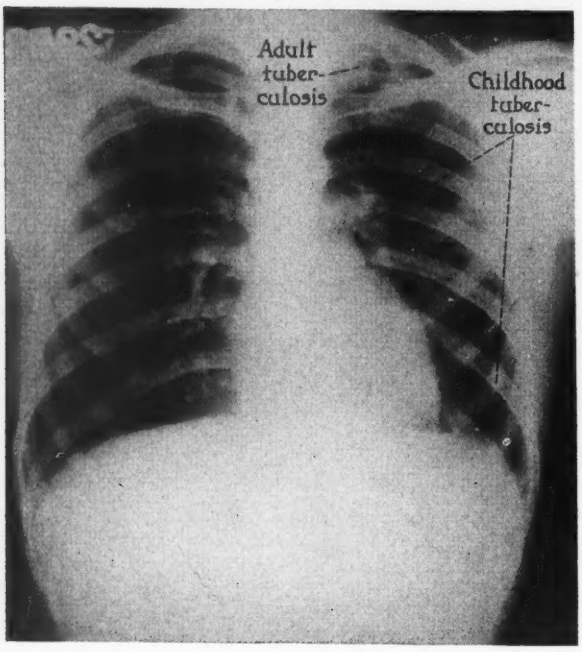

Fig. 7. Made from an X-ray film taken on July 25, 1929, of the chest of a boy of approximately fourteen years. This film shows the childhood type of tuberculosis represented by a Ghon tubercle beneath the shadow of the sixth rib and calcium deposits in the left hilum. It also shows the adult type of tuberculosis within the circle of the first rib and the first interspace on the left side. The childhood type was seen on X-ray films taken in 1923. The adult type did not begin to make its appearance in this case until 1925. Since that time it has slowly but surely progressed until a huge cavity is now present in the left lung.

how long the lesion existed before signs could be elicited, since tuberculous lesions may progress to extensive proportions without causing abnormal signs which can be elicited by physical examination.

When the physician makes an X-ray film examination, he may or he may not visualize shadows in the chest which indicate to him the presence of tuberculosis. If he does, he cannot express with any high degree of certainty how long these shadows have been present. He may talk about fibrosis, calcification, recent infiltration, et cetera, and yet from the standpoint of time he can make no definite statement. When he makes laboratory examinations of the sputum, for example, he may or may not find tubercle bacilli. If he does he has gained little or no information of value as to the duration of the tuberculous process. When he has completed the examination, if all the findings are positive—tuberculin, history, physical examination, X-ray examination, and laboratory examination—and all point to a small involvement, he is not justified in speaking of his case as one of early tuberculosis. The most that he can say is that the disease is minimal in extent. It may have been present for one month. It may have been present to approximately the same extent for many years. He does not know the length of time it has existed.

But how are we to arrive at the diagnosis of early tuberculosis? There is just one way and that is by periodic tuberculin tests of the members of our clientele from infancy or childhood on through all the periods of life. We start with the infant who reacts negatively to the tuberculin test, just as Sir Robert Philip does. We repeat the test after three to six months or at longer intervals if the physician desires. In many communities of this country now, the infant may go through the period of childhood and even adult life without ever reacting positively to the tuberculin test.

Let us say that he reaches college age, leaves his home environment, and comes in contact with tuberculous patients through the selection of a roommate who has unsuspected tuberculosis or through the care of tuberculous patients in a school of medicine. His tuberculin test has previously been negative. Six months later the test is repeated and is found to be positive. I know of nothing more certain in medicine than the fact that this young man now has a tuberculous lesion somewhere in his body. The interval since the last negative tuberculin reaction was short; therefore, the lesion is an early one in the strict sense of the word.

In all probability at this time the most careful examination of the living body known to the medical world will not reveal any evidence of the location of the lesion. It is too small to be demonstrated by our present methods of examination. The lesion is of the first infection or childhood type. It may remain so small or be located in some part of the body which lends itself to examination so poorly that it will never be demonstrated by our present methods of examination during the lifetime of the individual. Yet it is there. The tuberculin test stands alone but it merits the confidence of the physician.

On the other hand, the lesion may increase in extent and cause sufficient change in the tissues about it to obstruct the X-ray

and thus produce a shadow on the X-ray film. In other words, when the tuberculin test is first positive, the X-ray film of the chest may be entirely negative but subsequent films may reveal evidence of the lesion. Figures 1 to 4 illustrate such cases. We feel certain that each of them is an early case of childhood type of tuberculosis which will remain well under control. However, in all probability the tuberculin test will remain positive. Each of them is now a potential case of the adult and destructive type of tuberculosis. They may never develop it but the foundation is laid. Therefore, each one should be examined periodically for early adult tuberculosis by means of the X-ray. In such subsequent periodic examinations the tuberculin test as we now know it is of no avail. Its positiveness which continues over years simply indicates the hypersensitiveness to tuberculin which the body developed when the childhood type of tuberculosis made its appearance. The X-ray will lead us to the detection of the adult type of tuberculosis when it appears much earlier in most cases than symptoms, physical signs, or laboratory findings (Figures 5, 6, and 7). But films, like the tuberculin test in the early diagnosis of the childhood type, must be made periodically if the adult type of disease is to be diagnosed early in the strict sense of the word.

THE DIAGNOSIS OF BONE AND JOINT TUBERCULOSIS*

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A tuberculous lesion exclusively confined to bone is relatively uncommon. This is because tuberculosis usually attacks the end of the bone whose anatomical relation to the joint is so intimate that joint involvement almost inevitably results. It is wrong and confusing to speak of bone tuberculosis as entirely separate from joint tuberculosis. For this reason it is practical to consider them together, and, when referring to these lesions, to use the more general term "bone and joint tuberculosis."

During the past seven years at the University Hospital, over fifteen hundred bone and joint lesions have been diagnosed as of tuberculous origin. This figure represents an average of two hundred twenty-seven cases each year, many of which are of months or years duration when first admitted. The accompanying table illustrates the anatomical location of the lesions under discussion and their frequency of involvement.

Anatomical location	No. of cases	Per cent
Spine	647	41
Hip	395	25
Knee	202	13
Foot	54	3.3
Ankle	54	3.3
Hand and wrist	47	2.9
Elbow	46	2.8
Shoulder	39	2.3
Other bones, such as ribs, femur, radius, ulna, etc.	106	6.4
Total	1590	100.0

As our figures show, the extremities are prone to tuberculous infection, and since they are so readily accessible to examination it follows that previous errors of diagnostic and therapeutic omission and commission are plainly evident.

Each month we see two or three patients, who have, over their tuberculous joints, large poorly healed surgical scars containing multiple draining sinuses. They are thin, run down, anemic and feverish. Secondary pyogenic infections are firmly established. These patients have had a cold abscess or tuberculous joint widely opened and drained under the erroneous impression that the basic infection was a pyogenic one.

The object of this paper is to review the more important points which are helpful in establishing a positive diagnosis in cases of bone and joint tuberculosis.

While bone and joint tuberculosis may occur at any age its incidence is greatest during childhood and more especially between the ages of five and twelve years. During these years family contacts are

*Read before the meeting of the Alumni of the University of Michigan Medical School, June 16, 1932. From the Department of Surgery, University of Michigan.

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closest, so the presence of tuberculosis in another member of the suspect's family is of great help in diagnosis.

Exact details regarding the onset of the present illness are of considerable value, especially in differentiating between tuberculous and pyogenic infection. Following trauma, a gradual onset of stiffness limp and deformity without marked elevation of temperature, chills or other constitutional symptoms favors tuberculosis. Pain is extremely variable ranging from an agonizing type to a complete absence, and in tuberculosis of the hip, is often referred to the knee. Pott's disease may cause pain and tenderness closely simulating gall bladder trouble or appendicitis. Fleeting attacks of sharp shooting pain may occur during sleep causing the patient to cry out. A history of such night cries is of considerable significance and is more commonly observed in lesions of tuberculous origin.

Another strong link in the chain of evidence is the presence of a primary tuberculous lesion elsewhere in the body, as in the lungs or cervical glands. This finding is of great diagnostic importance and in our clinic has been present in approximately one-third of the cases.

The appearance of a tuberculous joint may in itself suggest the diagnosis. The synovial membrane is thickened and the fluid increased to such an extent that the joint is visibly swollen and appears even more so because of the severe soft tissue atrophy which takes place above and below it. Occasionally the joint cavity is markedly distended by a collection of cold abscess fluid which may have already perforated the capsule forming a peripheral soft tissue abscess. In order that the capsule may be relaxed to accommodate the increased fluid the joint is held in a position of flexion and the muscles controlling it are constantly in reflex spasm. For these reasons and also because of bone destruction and soft tissue contracture marked deformity is often observed.

Atrophy of the affected extremity is usually quite severe and is not limited to the soft tissues. The first and most noticeable finding in the X-ray plate is the severe atrophy of the bones. This loss of calcium salts is not limited to the joint but also involves the shafts. Associated with the atrophy we see destruction of cartilage, with loss of joint space, and, if the case is advanced, destruction of epiphyseal bone without new bone formation.

We consider the tuberculin skin test helpful in that a negative test with a strong solution practically rules out tuberculous infection.

The evidence gathered from the history, clinical examination and X-ray may be so strong that the presence of tuberculosis is a reasonable inference. No matter how strong the circumstantial evidence, however, or how seemingly reasonable the inference, we always seek direct positive evidence of tuberculosis if the lesion's anatomical situation will permit. A large aspirating needle is inserted into the joint, or cold abscess if present, and fluid removed for direct examination and guinea pig inoculation. Draining sinuses are always biopsied. If no sinuses are present and no fluid can be obtained by aspiration, the joint is opened and a good sized piece of synovial membrane is removed. One-half of the specimen is sent to our pathologist, the remainder to the bacteriologist. If the pathological sections do not show tubercles it is macerated and inoculated into a guinea pig.

In order that proper therapeutic measures can be initiated with hope of success, and also to properly evaluate benefit derived from treatment we consider it essential to establish beyond a doubt the nature of the pathological process under consideration.

UNDULANT FEVER (BRUCELLIASIS)*

WALTER M. SIMPSON, M.S., M.D., F.A.C.P.†
DAYTON, OHIO

The recognition of undulant fever as a common and widely distributed disease of man is largely a development of the past four years. The occasional sporadic cases which had been encountered in this country before that time were regarded as clinical curiosities; most of these were related to endemic foci of goat infection in Texas, New Mexico and Arizona. During the years 1927 to 1930, inclusive, the recorded cases number 217, 649, 1,301 and 1,385, respectively. During 1929 cases of undulant fever were recorded by state health departments in every state of the Union. While it is true that over 2,600 cases of undulant fever have been reported to state health departments during the past two years, these figures are of minimal value since they do not include the indeterminable but undoubtedly large number of cases which have been recognized as a result of confirmatory laboratory studies carried out in hospitals and private laboratories. Undulant fever is now a reportable disease in 32 states.

During the past three years the writer has investigated 128 cases of undulant fever in Dayton and the surrounding communities. These findings were the result of a determined effort to learn of the incidence of the disease in a circumscribed locality. Stimulated by a similar motive, Hardy[1] has investigated approximately 400 cases in Iowa. Carpenter[2] in New York, Huddleson[3] in Michigan, King[4] in New York, Bierring[5] in Iowa, Farbar and Mathews[6] in Indiana, Brown[7] in Kansas, Sensenich and Giordano[8] in Indiana, and Ey[9] in Ohio, have conducted similar investigations in their localities; their efforts have likewise been rewarded by the discovery of a large number of cases. The inference is obvious that the disease must be much more prevalent than is generally believed.

The first recognition of the disease along the Mediterranean Coast produced such synonymous designations as Mediterranean fever, Gibraltar fever, rock fever, Neapolitan fever and Cyprus fever. In 1886, David Bruce[10] isolated the organism responsible for the infection; he named the organism *Micrococcus melitensis*. The next great advance in the study of this disease was the application of the agglutination test as an aid to diagnosis by Wright and Semple[11] in 1897. Some eleven years after Bruce's discovery, Bang[12] of Copenhagen isolated the causative organism of contagious abortion of cattle, which he called *Bacillus abortus*.

A British Commission, headed by Bruce, investigated the disease on the island of Malta during the years 1904 to 1907. They demonstrated that the ingestion of raw goat's milk was the common source of infection for man. The prohibition of the use of raw goat's milk by the men of the military and naval forces produced an immediate and rapid decline in the incidence of the disease. Until very recently Malta (undulant) fever was almost invariably attributed to the ingestion of raw goat's milk or dairy products derived from raw goat's milk.

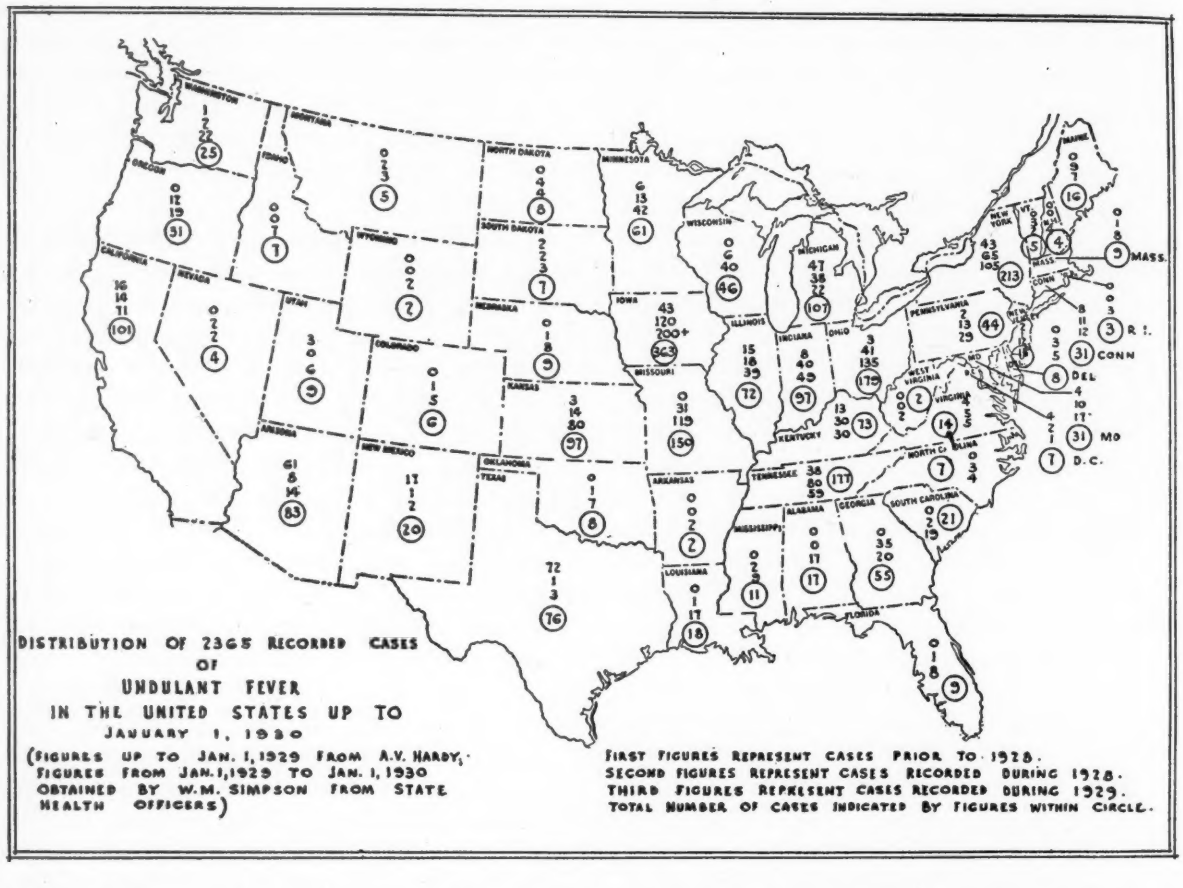
For twenty-one years the *Micrococcus melitensis* of Bruce and the *Bacillus abortus* of Bang were regarded as separate, unrelated species, until Alice Evans,[13] in 1918, discovered that the two organisms are indistinguishable morphologically, biochemically, culturally and by ordinary agglutination tests. The results of further studies led Evans to state that the two organisms probably possessed similar pathogenicity for human subjects. In 1927, Carpenter[14] recovered an organism indistinguishable from *Brucella abortus* from the blood of ten human beings with undulant fever; five pregnant heifers inoculated with these cultures promptly aborted. These observations of Evans and Carpenter have been confirmed by many workers throughout the world. It is now known that the organism which produces contagious abortion in cattle and other

*From the Diagnostic Laboratories of the Miami Valley Hospital, Dayton, Ohio.
Presented before the Medical Section of the Michigan State Medical Society, Pontiac, Michigan, September 23, 1931.

†Dr. Simpson is Director, Diagnostic Laboratories, Miami Valley Hospital, Dayton, Ohio; was formerly Senior Instructor in Pathology, University of Michigan; awarded gold medal by American Medical Association for exhibit of studies in Tularemia, Minneapolis, 1928; awarded gold medal (Ward Burdick Research Award) for investigations of Tularemia and Undulant Fever by American Society of Clinical Pathologists, Portland, Oregon, 1929; President, American Society of Clinical Pathologists, 1932-1933.

domestic animals is capable of producing in human beings a disease clinically and bacteriologically similar to the Mediterranean type of Malta fever.

It became apparent that the *abortus-melitensis* group of organisms should be reclassified. Meyer and Shaw[15] proposed that the organisms of this group should be designated by the generic name *Brucella;* this suggestion has met with universal approval. It is generally accepted that there are three important varieties of *Brucella.* The organism usually associated with infection in goats is called *Brucella melitensis* variety *melitensis;* the organism of contagious abortion of cattle is usually referred to as *Brucella melitensis* variety *abortus;* the organism ordinarily found in swine infections is designated as *Brucella melitensis* variety *suis.* The *Brucella* exhibit marked pleomorphism; coccoid and bacillary forms, as well as intermediary oval forms, are commonly observed. Attempts to divide the organisms of the *Brucella* group into distinct caprine, bovine and porcine varieties have not been uniformly successful. Organisms which have been designated as porcine or caprine types have been recovered from cow's milk. In the light of present knowledge it seems desirable to refer to all of the varieties as the *Brucella.* Furthermore, the confusion resulting from the many names which have been used to designate the disease caused by *Brucella* in animals and man would be overcome by the adoption of the single designation *Brucelliasis.*


DISTRIBUTION OF 2365 RECORDED CASES OF UNDULANT FEVER IN THE UNITED STATES UP TO JANUARY 1, 1930
(FIGURES UP TO JAN. 1, 1929 FROM A.V. HARDY; FIGURES FROM JAN. 1, 1929 TO JAN. 1, 1930 OBTAINED BY W.M. SIMPSON FROM STATE HEALTH OFFICERS)
FIRST FIGURES REPRESENT CASES PRIOR TO 1928.
SECOND FIGURES REPRESENT CASES RECORDED DURING 1928.
THIRD FIGURES REPRESENT CASES RECORDED DURING 1929.
TOTAL NUMBER OF CASES INDICATED BY FIGURES WITHIN CIRCLE.
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Among urban populations the disease appears to be chiefly transmitted through the raw milk of cattle infected with the *abortus* variety of the organism. Of the 128 cases of undulant fever studied by the writer, the ingestion of raw milk containing the organism of contagious abortion of cattle was demonstrated to be the source of infection in the great majority of instances; these findings are corroborated by the investigations of Carpenter, King, Orr, Huddleson, Barbar, Mathews, Sensenich, Giordano, Ey and others. Hardy, who has conducted extensive studies of the disease in Iowa, expresses the belief that direct contact with infected cattle and hogs has been responsible for a great number of cases of undulant fever occurring in that State. Hardy's in-

vestigations lead him to the conclusion that the *abortus* and *suis* varieties of the organism are about equally responsible for the undulant fever morbidity in that State. Hardy[16] has demonstrated by animal experiments that the skin may act as the portal of entry of the organism. Otero,[17] of Porto Rico, has reproduced the disease in human volunteers by inoculations through abraded skin. It is apparent, therefore, that there are two important sources of infection for man, namely, the ingestion of raw milk or unpasteurized dairy products containing the *Brucella*, or direct contact with infected fresh animal tissues.

CLINICAL MANIFESTATIONS IN MAN

Because undulant fever presents many symptoms and signs common to typhoid fever, malaria, tuberculosis and influenza, it is frequently confused with these diseases. Many physicians have arrived at a tardy diagnosis of undulant fever only after repeated negative Widal reactions, the failure to demonstrate the malarial plasmodium, and the inability to elicit physical signs or roentgenographic evidence of tuberculosis. Less often, the disease has been confused with acute rheumatic fever, subacute bacterial endocarditis, bronchitis, pyelitis or tularemia.

As a result of the more extensive studies which have been made during the past few years, it has become increasingly apparent that a majority of the cases of undulant fever present a more or less characteristic clinical picture. The disease appears to occur predominantly among males, particularly in rural districts. Young and middle-aged adults are most often affected. Children appear to possess some degree of immunity to the disease; ten per cent of the patients in the Dayton series of cases were children in the first decade of life.

The incubation period has been found to vary from five days to three weeks; the average incubation period is two weeks. The prodrome is not unlike that of any general infection, although in occasional cases the disease is initiated with a chill and a rapid elevation of temperature to 103-105° F. Ordinarily, the patient becomes gradually aware of an afternoon or evening rise of temperature, associated with chills, nocturnal perspiration and marked weakness. The fever, chills and sweats usually pursue a characteristic course. The patient usually feels quite well in the morning, particularly in the early stages of the infection. As the daily elevation of temperature develops, usually during the afternoon or evening, the symptoms return. The nocturnal exacerbations of fever occasionally reach great heights (106-107° F.). The average maximum fever is 103° F. There is often a remarkable disparity between the subjective sense of feverishness and the extent of fever as registered by the clinical thermometer; in many instances the patient does not complain of fever nor does he present a febrile appearance, but the physician finds, to his great surprise, a fever of 102 to 103° F. As the fever abates, chills and sweating occur. If defervescence is rapid, the perspiration is more likely to be of a drenching character. The chills are sufficiently severe to be regarded as true rigors in about one-third of cases. There has been no history of chills in about 10 per cent of patients who have experienced fever and sweats.

Marked restlessness and insomnia usually accompany the nocturnal febrile exacerbations. Delirium occurs in some cases in which the fever reaches great heights. Ordinarily, the mental state remains clear during the febrile course of the disease; the so-called "typhoidal state" is rarely, if ever, observed.

The matutinal remissions and the nocturnal exacerbations of fever may last from one week to several months. The name "undulant fever" refers particularly to recurring relapses of fever. Such febrile relapses appear to be the exception rather than the rule in the recently described American cases; most patients have experienced but one febrile period, lasting from one week to several months, and finally reaching the normal level by lysis.

The essential gastro-intestinal complaints are anorexia and constipation. The degree of constipation appears to parallel the severity of the infection. Diarrhea is of rare occurrence.

Loss of weight is an almost constant feature of the disease. Patients experiencing a severe infection will often lose from twenty-five to fifty pounds in weight.

With the exception of fever and the presence of the stigmata of weakness and loss of weight, there is often a remarkable absence of positive physical findings. The

spleen is palpable in about one-third of the cases. Tenderness or pain of the joints, or muscles, or both, is likewise observed in about one-third of the cases. The presence of migrating pain in the larger joints has led to confusion with acute rheumatic fever. No permanent impairment of the joints has been observed.

Abdominal pain is a prominent complaint in about 12 per cent of cases; this is most common early in the course of the disease. The pain may be generalized or confined to any one of the abdominal quadrants. In one instance, reported by Bowers and the writer,[18] gangrenous appendicitis developed as a complication during the third week of illness. There are many instances on record of needless, and perhaps harmful, surgical intervention in cases of undulant fever in which the abdominal symptoms were a prominent feature of the disease.

Symptoms referable to the genito-urinary tract have appeared in some cases. There is evidence that the organism occasionally exhibits the same predilection for the genital tract of human beings that it does in cows or bulls. Painful swelling of the testes occurs in about 10 per cent of cases. This complication is usually transient, but in occasional instances, suppurative orchitis and epididymitis have occurred. In one case reported by the writer,[19] *Brucella abortus* was recovered from a draining sinus tract which extended from the globus major of the epididymis through the scrotal wall.

There is some evidence that *Brucella* infection may be a factor in certain cases of abortion in women. The literature contains many reports[20] of human abortion occurring on farms where contagious abortion of cattle was common. Kristensen[21] isolated the *abortus* variety of the organism from the exudate which covered the uterine site of the placenta of a seven month human fetus. Carpenter[22] has recovered the organism from the tissues of a human fetus which was aborted at the end of the fourth month of gestation. Frei[23] has isolated *Brucella* organisms from the vaginal discharge of a woman who had aborted ten days previously. Other investigators, notably Harbinson,[24] Ey, and the writer, have found strongly circumstantial serologic evidence that *Brucella* infection was a factor in the production of several cases of human abortion.

A skin eruption, usually macular or maculo-papular, is a relatively infrequent finding; the skin lesions may simulate the roseola of typhoid fever.

Hematologic studies usually yield important information. Some degree of secondary anemia, usually proportionate to the severity of the illness, is almost invariably present. The great majority of cases exhibit leukopenia, with the white blood cell count ranging from 4,000 to 6,000. A relative, and in some cases an absolute, lymphocytosis usually accompanies the leukopenia. Occasional patients with the mild form of the disease show very little deviation from the normal as regards the blood picture.

The urinalysis usually reveals the trace of albumin commonly found in febrile diseases. The cerebrospinal fluid may show slight lymphocytosis and an increased sugar content, but in most cases shows no abnormalities.

CLINICAL TYPES

Four types of the disease are generally recognized: (1) Intermittent, (2) ambulatory, (3) undulatory, and (4) malignant.

(1) *Intermittent type.* The majority of cases which have been observed in the United States fall into this group. The disease pursues a subacute course, with fever of an intermittent character; the morning temperatures vary from normal or slightly subnormal to 100° F., while the evening temperatures usually range from 101 to 104° F. The average duration of this type of the illness is from three to four months.

(2) *Ambulatory type.* Approximately one-fourth of the cases are characterized by a relatively short and mild illness. Many persons in this group will remain at their work although aware of the existence of mild fever and a marked sense of weakness. The symptoms and signs of this form of the disease are essentially the same as in the intermittent type, except that they are much less severe. Such cases are frequently confused with influenza.

(3) *Undulatory type.* This form of the disease is characterized by the occurrence of relapses. This feature of the disease was said to be of frequent occurrence in the Mediterranean cases, but has been present in only about 15 per cent of the cases which have occurred in this country. The successive relapses usually decrease in intensity and duration. Such cases usually pursue a

more chronic course than the other forms of the disease. Physical and mental deterioration is more commonly observed in the undulatory form of the disease than in the other forms.

(4) *Malignant type.* This form of the disease is rare, having occurred in only about 2 per cent of the cases reported in this country. A sudden onset, an acute course with extreme hyperpyrexia and a fatal termination in the majority of cases are the characteristics of this unusual form of the disease. The duration of this type of the disease is usually from one to three weeks.

DIAGNOSIS

If undulant fever is given consideration in the differential diagnosis of all cases of febrile illness, especially in those in which the diagnostic criteria for typhoid fever, tuberculosis, influenza, malaria, chronic bronchitis, pyelitis, rheumatic fever or bacterial endocarditis are not convincing, the disease will be recognized with much greater frequency. This is true in cases of vague mild febrile disease as well as in those in which the clinical manifestations of undulant fever are more clearly defined. In such cases it should become an established practice to submit 4 or 5 c.c. of the patient's blood, collected exactly as for the Wassermann test, to a laboratory equipped with the proper antigens, for the agglutination test. The rapid macroscopic agglutination method of Huddleson[25] is a simple and reliable procedure.

Anti*abortus* serum agglutinins may appear as early as the fifth day, but in most instances they appear sometime during the second week of illness. It is, therefore, unwise to collect the blood specimen for the agglutination test until a week or ten days after the onset of illness. In occasional cases agglutinins will not appear until the third or fourth week of illness. The agglutination titer rises to variable heights during the acute course of the disease and tends to fall when the fever abates. Ordinarily, agglutination in dilutions of 1:160 to 1:1280 will be found during the fourth or fifth week of illness. Many persons will retain anti*abortus* serum agglutinins for many months or years, while in other cases they will entirely disappear a few months after recovery.

There is convincing evidence that about 5 per cent of individuals with undulant fever, from whose blood the organism may be recovered, fail to develop anti*abortus* serum agglutinins. Furthermore, some patients who exhibit a well-defined clinical picture of undulant fever, and from whose blood *Brucella abortus* has been recovered, will show agglutination in titers below 1:80. It cannot be said, therefore, that there is any arbitrary diagnostic agglutination titer. For practical purposes, diagnostic significance is usually attributed to agglutination in dilutions of 1:80 or above. In patients in whom the clinical manifestations are strongly suggestive, the absence of agglutinins or the presence of agglutinins in titers of 1:10 to 1:40 should stimulate further serologic and bacteriologic studies. The skin test, using an *abortus* antigen, appears to be of value in differentiating the cases in which agglutinins are absent or are present in low titer.

In rare instances, subclinical *Brucella* infections have occurred in persons who have been exposed to the infection; anti*abortus* agglutinins have been demonstrated in the serums of such persons in the absence of clinical symptoms or signs of the disease. Carpenter, Boak and Chapman[26] have submitted convincing evidence that anti*abortus* agglutinins develop only when there has been actual invasion of the tissues by living *Brucella* organisms.

The occasional cross-agglutination of the *Brucella* and *Bacterium tularense* should be borne in mind. Francis and Evans[27] have suggested that all serums from suspected cases of tularemia or undulant fever should be tested for both anti*tularense* and anti*abortus* agglutinins, unless the clinical history points definitely to a recognized source of infection for either undulant fever or tularemia. If it should develop that the *abortus* and *tularense* titers are the same, or nearly the same, agglutinin absorption tests will distinguish between them. The writer[28] has found *abortus-tularense* cross-agglutination in 16 of the 88 cases of tularemia and in 20 of the 128 cases of undulant fever which he has investigated.

Since a bacteremia is present in this disease, an attempt to recover the organism by blood cultures should be made whenever possible. Blood for cultures should be collected early in the course of the disease and preferably at the crest of one of the pyrexial waves. The likelihood of recovering the organism is greater if broth mediums are

inoculated directly; the carbon dioxid requirement of certain strains should be borne in mind.

Urinary specimens for culture should be collected through a sterile catheter. Amoss[29] has recently described a successful method for the recovery of *Brucella* organisms from feces.

Guinea pigs may be inoculated intraperitoneally with the patient's blood or saline suspensions of macerated tissue. Six to eight weeks should elapse before autopsy. Loss of weight, the presence of enlarged joints, enlarged testes and seminal vesicles, small whitish foci of necrosis in the enlarged liver, spleen and lymphnodes should be noted. Cultures should be made from the lungs, liver, spleen, kidneys, testicles and lymphnodes.

PROGNOSIS

Fatal outcome is rare, having occurred in from 1 to 4 per cent of reported cases; during 1929, 41 deaths were officially recorded by the United States Public Health Service as having been due to undulant fever. The importance of the disease is not to be judged by the death rate. The prolonged course and resulting invalidism make the outlook much more serious than the death rate would indicate.

TREATMENT

The most important consideration in the control of undulant fever is prophylaxis. The widespread distribution of the infection among cattle renders it difficult to control the infection at its source. While veterinarians and public health workers are striving to check the infection among animals, there appears to be but one logical method for preventing the transmission of milk-borne infection to human beings, and that is by pasteurization. Park,[30] Boak and Carpenter,[31] and Zwick and Wedeman[32] have demonstrated that complete pasteurization (143-145° F. for 30 minutes) will destroy the *Brucella*. The need for strict supervision of the pasteurization process is apparent. For the protection of the health of those persons whose occupations bring them in direct contact with infected animal tissues we must rely upon education and the institution of precautionary measures.

The rapidly accumulating knowledge of the widespread distribution of undulant fever has done much to focus the attention of public health workers, veterinarians and milk producers upon the urgent necessity of eliminating milk-borne infection among human beings. Very little progress has been made in the control of the infection among cattle. While efforts are being made to control the infection at its source, all public health workers should be guided by the advice offered recently by Alice Evans:[33]

"For the protection of milk consumers the preventive measure is quite obviously the same as that practiced for the prevention of other infectious diseases that are spread by milk, namely, pasteurization. Those who are able to pay the price for certified milk may take raw milk with a reasonable degree of safety, *if the certification guarantees that the milk is from an abortion-free herd.* No milk other than that so certified, or pasteurized milk, can be considered safe, for the cattle disease is widespread everywhere in the United States. It is fortunate that the preventive measure of pasteurization is so easily available."

The treatment of the disease in human beings has been essentially directed toward alleviation of the prominent symptoms. Mercurochrome, acriflavine, neoarsphenamin, quinine, and non-specific protein therapy have been advocated by several physicians. For the most part these therapeutic observations have not been subjected to adequate control and the very length of the list argues against the specificity of any of these measures.

Many observers have reported favorable results with specific vaccine therapy. The writer has prepared and utilized a *Brucella abortus* vaccine, standardized to two billion heat-killed or formalin-killed organisms per cubic centimeter, for use in the treatment of 60 of the local cases, and has distributed the vaccine to some 350 physicians in various parts of the country, with results which appear to justify its use. Comparison with a series of untreated control cases appears to indicate that the vaccine usually terminates or shortens the course of the disease and prevents recurrence. Since undulant fever is often characterized by natural remissions, the value of any therapeutic measure must be interpreted with caution.

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EXAMINATION OF THE BACK*

SOME NOTES AS TO SIGNIFICANCE OF FINDINGS

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Few cases offer more perplexing problems from the diagnostic standpoint than the chronic lame back. This is especially true of the "industrial lame back." During the present period of economic distress many unjust claims are being made against employers of labor and insurance companies. Many closed cases are being re-opened, disabilities tend to be lengthened and imaginary ones developed. Even for the specialist it is difficult at times to determine what, if anything, is wrong with certain individuals who present themselves for examination. Imagined and feigned disabilities are difficult to distinguish from actual ones, and it is often hard to differentiate the traumatic neurosis from real pathology. As settlement of claims is based largely on medical opinion, often expressed by the patient's family physician, it is essential that his opinion be based on as accurate data as it is possible to obtain, and that every means be employed to arrive at an accurate and impartial conclusion. With

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this in mind the following technic of examination is presented together with brief notes as to the significance of some of the findings. No apology is made for discussing a subject which may seem elementary, as a similar paper was read at a recent meeting of the American Orthopedic Association.

The patient is stripped. As he stands in a natural attitude, heels squarely together, toes out and facing straight forward, the back is inspected for any obvious deformity such as scoliosis, total list, or kyphosis. A total list or lateral deviation, so-called "sciatic scoliosis," usually indicates a lesion of the sacro-iliac joint on the opposite side, either mechanical or inflammatory. It is not pathognomonic, however, as it may be present as a result of lumbo-sacral pathology or a combination of lumbo-sacral and sacro-iliac involvement. Occasionally the list is homolateral. A kyphosis at once leads to the diagnosis of a destructive lesion of one or more vertebræ, most commonly compression fracture, Pott's disease, metastatic carcinoma or neurotrophic spine. Loss of lumbar lordosis is frequently seen in acute lumbo-sacral or sacro-iliac strain or arthritis, in hypertrophic arthritis and in destructive lesions of the lumbar spine. A true kyphosis is seldom present in the lumbar region.

An increase in lumbar lordosis may be due to a developmental anomaly of the lumbo-sacral region, may be purely postural, or may be indicative of spondylolisthesis, especially if there is a history of injury.

Atrophy of the gluteal muscles is seen in sacro-iliac lesions.

Viewing the patient from the side, the general body posture and shape of the abdomen and chest are noted. A plumb line dropped from the tip of the mastoid process should fall through lines projected from the shoulder, the great trochanter and the back of the patella. If the angle of inclination of the pelvis cannot be determined accurately by inspection it is wise to measure the so-called "lumbar index," or to take a roentgenogram of the lumbar spine and pelvis in the lateral projection with the patient standing and measure the lumbo-sacral angle after the method of vonLackum. To obtain the lumbar index a straight-edge is placed against the spine and the distance from this to the apex of the lumbar hollow is measured. This is normally 30 to 40 mm. An increase in this measurement often means an increase in the angle of inclination of the pelvis greater than the normal of 42.5 degrees and is highly suggestive of a mechanically weak lumbo-sacral joint.

Then again viewed from the back, the patient is asked to bend as far forward as possible, keeping the knees locked. Then he hyperextends the back, flexes laterally both ways and then obliquely forward and backward. If the patient complains of a unilateral low back pain he is asked to flex the spine with the knee and hip on the affected side slightly flexed. In sacro-iliac lesions the range of flexion of the spine is greater in this position than with both knees completely extended, while in lumbo-sacral lesions the range is the same in either position. During these motions we observe general or segmental limitation of motion, fibrillary muscular twitching, and ask the patient to designate accurately points where pain is felt. These are marked with a skin pencil.

While the patient is standing there is opportunity to observe the posture of the feet and to look for varicose veins.

The patient is then asked to sit on the examining table. The same motions of the spine are then carried out as in the standing position. In sacro-iliac lesions acute flexion in this position will not be limited as in the standing position, as the hamstrings are relaxed, whereas in lumbo-sacral lesions the range of motion is the same sitting and standing.

At this point some items in the general physical condition of the patient are noted. Those which may have particular bearing on the back pathology are the condition of the teeth and tonsils, tenderness over the frontal sinuses and antra, cervical adenitis, the blood pressure, the reflexes, and the condition of the joints of the extremities, especially the presence of deformity such as Heberden's nodes, limitation of motion and crepitation. Any gross abnormalities in the lungs and heart are noted and the chest expansion measured. In such conditions as ankylosing spondylitis, limitation of rib excursion with respiration is a common and early finding.

Then with the patient in the dorsal prone position the abdomen is examined for kidney, gall bladder and peri-cecal tenderness and for fecal masses in the colon.

In this position the patient's thighs are flexed with the knees extended. Unilateral

limitation, or, in other words, a unilaterally positive Kernig sign, indicates sacro-iliac pathology. It is due to sciatic irritation and spasm of the flexor muscles of the thighs. It is to be recalled in this connection that the sciatic nerve arises from several lumbar as well as sacral roots and that lesions in the lumbar spine often produce sciatic pain, and a positive Kernig sign.

The hips and knees are then flexed at the same time, the patient being assisted in this motion by the pressure of the right hand of the examiner against the patient's knees. The examiner's left hand is placed beneath the lumbar region. If the patient complains of pain in the back during this test an attempt is made to determine whether the occurrence of pain coincides with the flexion of the lumbo-sacral joint.

Outward pressure against the anterior superior iliac spines theoretically tends to separate the symphysis pubis and the sacro-iliac joints and produce pain in the latter when a lesion is present. Likewise, lateral pressure on the ilium, the patient lying on the affected side, may produce pain in a diseased sacro-iliac joint. In differentiating sacro-iliac from lumbo-sacral pathology, and between right- and left-sided lesions, Gaenslen's test is of much greater value.

"The patient, lying supine, flexes the knee and the hip of the same side acutely, the thigh being crowded against the abdomen with the aid of both the patient's hands clasped about the flexed knee. This brings the lumbar spine firmly in contact with the table and fixes both the pelvis and the lumbar spine. The patient is then brought well to the side of the table, and the opposite thigh is slowly hyperextended by the examiner, with gradually increasing force by pressure of the examiner's hand on the top of the knee. With the opposite hand, the examiner assists the patient in fixing the lumbar spine and pelvis by pressure over the patient's clasped hands. The hyperextension of the hip exerts a rotating force on the corresponding half of the pelvis in the sagittal plane through the transverse axis of the sacro-iliac joint. The pull is made on the ilium through the Y ligament and the muscles attached to the anterior superior and inferior spines. As a result of the impaired ligamentous support on the diseased side, this rotating force causes abnormal mobility accompanied by pain, either local or referred on the side of the lesion."

Then with the patient in the ventral prone position the spinous processes are palpated with the thumb, beginning at the occiput and continuing down to the sacrum. Bone tenderness leads one to suspect actual bone pathology. If localized over one vertebra, compression fracture and tuberculosis are the most likely causes. In other less common diseases of the bone, tenderness is usually present over several vertebræ, *e.g.*, multiple myeloma and metastatic carcinoma. All of the above lesions will be demonstrable by careful roentgenological study. In industrial accident cases, bony tenderness without X-ray evidence of bony injury or disease is strongly indicative of malingering.

Palpation is next carried out laterally over the articular facets and muscles. While palpating it is important to note whether tender points coincide with the pencil markings previously made. When an injury exists the tender points should correspond (with slight variation). When these points do not check up reasonably well, a suspicion of malingering may arise. The amount of pressure required to produce pain is also noted. This can be estimated fairly well by finger palpation. Accurate as our estimate of this may be, the labor boards are usually not willing to accept a physician's word as to the severity of a subjective symptom in preference to the patient's. To accurately estimate the amount of pressure necessary to produce pain, a very useful instrument has been devised by Dr. Paul B. Magnuson. It consists of "a spring scale plunger with a padded ball on the end, the pressure being recorded by a sliding ring which remains in place after a given amount of pressure has been put on the ball." If the patient complains of pain on one-half to one pound pressure, it would be reasonable to suppose that the point was very tender. If the patient's attention is distracted and it is then found that ten or fifteen pounds pressure is required before pain is noticed it may be assumed that the patient is malingering or at least that the point is not as tender as the patient claims.

The sacro-iliac joints, the attachments of the ilio-lumbar ligaments, the sacro-sciatic notch and coccyx are palpated last. Sacro-iliac lesions usually produce tenderness at the notch, while lumbo-sacral lesions do not, although they may produce referred pain to this area. In the absence of a history of

direct violence to the coccyx such as a fall on the ice, the presence of coccygeal pain and tenderness is frequently indicative of a neurosis, although lumbo-sacral lesions may produce coccygeal pain referred by way of the middle sacral nerve. An arthritis of the sacro-coccygeal joint also causes localized tenderness and pain on manipulation of the coccyx by rectum.

With the patient in the ventral prone position, acute flexion of the knees in the presence of an irritative lesion of the lumbo-sacral joint, such as an arthritis, causes the entire lumbar spine to rise from the table, so-called Ely's sign. When the knees are flexed the tension of the muscles and ligaments attached to the front of the pelvis is increased. This tends to rotate the pelvis around a transverse axis and hyperextends the lumbo-sacral joint. The muscles controlling this joint then go into action to prevent this motion and hold the spine rigid. Consequently the hips flex slightly and the lumbar spine rises from the table.

In attempting to diagnose conditions of the back and in estimating disability one must constantly bear in mind that the structures which make up the back are frequently affected by lesions and conditions in other parts of the body. Therefore, in addition to the above examination, every back case should be subjected to as thorough study as the one suffering from some cardiac or gastro-intestinal disease. All the laboratory aids to diagnosis should be used. X-ray studies, while always indicated in these back cases, are often of minor importance in the estimating of disability. The industrial physician should therefore be a diagnostician of the highest order. Once he perfects himself along these lines many of the obscure and troublesome problems relating to industrial lame back will solve themselves easily and quickly to the satisfaction of the patient, the employer and the doctor himself.

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THE SHIP SURGEON'S CAREER

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The following paper is an account of a season's experience as ship surgeon on a transatlantic liner by Dr. Wynand Pyle of Detroit, brother of Dr. Henry J. Pyle of Grand Rapids, Speaker of the House of Delegates. Dr. Pyle relates an interesting experience. During the past few years we have printed each year travel experiences of our members who have visited unusual places or whose experiences have been out of the ordinary. The response of our readers has led us to feel that such articles, though not the kind that ordinarily appear in medical journals, are nevertheless good reading and are therefore welcome.—EDITOR.

The last week of April, A. D. 1931, found me sailing from New York as ship's surgeon on the Twin-turbine Royal Mail Ship Volendam bound for the tropics. Six weeks before, I had said good-bye to the syndrome known as overhead in my practice, starting on the sabbatical year I had long promised myself. My plans had included modest travel and some study, but my expectations had not risen to a situation such as this in which I could combine pleasure with remunerative work.

We were on the first lap of what is known as a Spanish voyage, that is, one whose chief object is to provide for the vernal migration of Spaniards and other Spanish speaking people from the Americas and Cuba to Spain for the summer months; the return voyage is made in the autumn. We were running practically without passengers as far as Vera Cruz, our first port of call, and I had ample time to acquaint myself with the officers and the crew, and ascertain what was expected of me and what I might look for. The prospects were glowing, especially when contrasted with the cold, fortunately obsolete, regulations to which I had agreed in the Dutch Consul's office in New York. In the presence of this representative of the water scout of Rotterdam I had signed a document in which, among other things, I had waived the provisions of the Dutch law which exempted seamen from service along

the Gold Coast when pirates were known to be active there and agreed to the company's minimum allowance, if necessary, of so many grams of butter per week and that a certain amount of dried fish could be substituted for an equal amount of the meat ration.

Yes, it was clear that I might find the life endurable. A respectful steward had conducted me to my cabin, a cursory survey of which revealed two port-holes, a window-seat couch underneath them, a large fan, a swivel chair, desk, book-case, wardrobe, and an ample set of drawers built underneath the high, curtained berth. The steward asked me what hour I wished to be wakened and whether I wanted coffee or tea for the ceremony. I chose 7:30 as the hour and intimated that coffee might help me bear the ordeal of having to be aroused. Adjoining this cabin I found the doctor's private office for the first and second class passengers. Here I found a book of information for ship surgeons, giving various regulations as to medical reports, the uniform, and incidentally revealing the fact that the doctor "ranked equally with the first officer under the captain."

But I never found it necessary to assert my position. My fellow officers, though somewhat more conservative than Americans, were genuinely hospitable and cooperative. The captain asked about previous experience on the sea. When I told him that my limited experience did include a departure from Siberia on an ice breaker in midwinter followed by a voyage in the open Arctic during the war he seemed much encouraged in the matter of the new doctor. However, he said, "If you do become seasick don't try to shame yourself into being about. Stay abed." However, I never missed a meal of the excellent cuisine for which the line is noted.

The professional activities of the day began with sick call for the crew at the hospital at nine o'clock. My aides here were two male nurses, one a man of forty years' experience, the last twenty-three of which had been spent on the sea. Most of these years had been spent serving a ship's doctor who had left the care of most injuries to him. In anything but severe trauma my position seemed to be perfunctory; at best, I acted in an advisory and controlling capacity. Even the matter of sutures was included in the first aid rendered by him. Internal medicine, however, seemed beyond his scope; he always left that matter to the doctor. The other aide was a German Pole who had joined the line in the days when there were many Polish emigrants. He had a wide knowledge of pharmacy and spoke various languages.

Holding morning sick call was a short and pleasant office, where I learned most about the lives, thoughts, attitudes, and activities of the toilers of the sea. Much as military discipline is necessary in running a ship, I encountered little of that feature of military life known in the English army as "swinging the lead" and in the American army as "gold-bricking." I did find it occasionally among some work-their-ways in the steward service. The real rope sailors scorned to ask medical advice or to be excused from duty for lesser injuries and illnesses. They were descendants of the sailors of the days of wooden ships and iron men, and any attempt on the part of a man to soften his existence would call forth the remark, "But now we have iron ships and wooden men."

Sick call was usually completed in time to allow for a half hour's constitutional before reporting for the one part of the daily program which was attended with military precision, namely, the captain's ten o'clock conference. Here all happenings of any import that had occurred in the preceding twenty-four hours were brought up by the heads of the various services. Here are reported serious and likely to become serious illnesses and injuries. The instructions received never intruded into my work, but there was always the attitude on the part of the skipper that he wanted to know what was going on in my service as well as the others. Though the captain's ruling on any matter could be absolute, it never went beyond the hint not to be hasty in the matter of putting a sick man ashore for hospitalization or operation at an out-of-the-way port, or having to explain the necessity of sending a man home to Rotterdam by a more direct voyage than ours. At the captain's call I learned in due time that when a stowaway is found aboard the ship, the personnel of the department in which he is found, as well as the captain and the navigation officers, lose their sea pay known as premium.

I have always thought of the term "getting one's sea legs" as being a figure of

speech. After six days out I learned that the least that can be said to the contrary is that the expression has its origin in a definite pathological entity. I learned that it was one thing to spend a voyage lounging in a deck chair, leaning on the rail, and taking brisk walks, and another to keep one's balance while carrying on such duties as peering into and treating a throat and other matters of professional routine. Hitherto little used muscles had been brought into a state of tonus and I found myself walking around with a gait and posture seen in the tenderfoot the day after a horseback ride. The disability was complicated by the appearance of an edema of the tissues around the joints, brought on apparently by a perfectly calm day in the Gulf with the thermometer in the high nineties and the air dripping with warm mist. Since that time I have often been called upon to reassure Northerners on winter cruises in the tropics that they were not being attacked by a crippling arthritis when these alarming joint symptoms appear.

As we approached Vera Cruz I got my first hint of the most important phase of a ship surgeon's duties, namely, the contact with port authorities. I was asked to sign a series of statements referring to the physical health of the passengers and crew, some further statements as to the sanity of all on board, ending with a solemn affirmation that there were no prostitutes on the ship.

Another important function of the doctor is to control the matter of sick persons coming aboard, not only because of the menace of infectious disease to the health and peace of mind of passengers and crew, but to avoid difficulties with officials at ports of call, and most of all to avoid the formalities necessary in case of a death. Due to the fact that King Alfonso had just abdicated the throne of Spain, making that country again a healthy climate for many expatriates, an unlooked for number of passengers poured aboard over three gang-planks at Vera Cruz and Havana. Moribund and infectious cases might easily have escaped the notice of the new medico. Before sailing I questioned a cachectic old gentleman, barely ambulant, about his general health. Yes, he was afflicted with stomach trouble, but he was much improved now; he was to finish his convalescence with a vacation in Spain. After sailing I learned from his friends aboard ship what the Mexican physicians had seen fit to tell them, that the man was a victim of an inoperable carcinoma.

Another passenger who escaped my notice until we were safely out at sea was a woman whose general appearance did not need the eye of a physician to note that she was very near term. In spite of the evidence, the passenger department would probably not have supported very heartily my turning her away at the gangplank. Furnishing childbed care for healthy multiparæ was a commonplace in the transatlantic service in the pre-quota days. There was space in the doctor's journal providing for the listing of a dozen births. My old nurse told of having cared for nine mothers in the steerage within thirty-six hours. What had happened, of course, was that one normally begun labor had excited sympathetic pains in another mother, she perhaps in two more, and so on until everyone in steerage anywhere near term was delivered.

This incident serves to remind me that one cannot escape all the evils of a professional existence on shore by running away to sea as I did. Least of all did I suspect that the evils of the free clinic would be found aboard. When the lady came above deck after leaving Havana and I saw the unmistakable evidence of the impending event, I sent my polyglot nurse to see if he had a tongue in common with her and to collect a few important dates for me. He returned with the information that even she expected the event within a few days, and that it had not discouraged her embarkation at all. In fact, it had encouraged it. For her previous confinements she had had the services of midwives; if the passage money included hospitalization and the services of a doctor when necessary, why should she not avail herself of them? So here was the doctor facing the possibility of starting his Sabbatical year working in the ungrateful branch of the practice of medicine from which he had hoped he had escaped forever. Oh well, there was still a chance that the young Pole would arrive in Europe *in utero*.

However, by way of being prepared for the occasion I inspected the labor room. The Volendam, while not the largest of liners, was but seven years old and modernly equipped. There were sterilizers of all sizes, drum after drum of sterile dressings. An inspection of the instrument cabinets re-

vealed instruments for obstetrical complications from the commonest to the rarest.

The inspection opened my eyes to the entire matter of medical equipment. Besides the labor room, the hospital provided a ward for men passengers, another for women, still another for the crew, and an operating room. On the deck above were two isolation rooms and two rooms for mental cases. There were splints and dressings for all emergencies, and a supply of drugs that would put to shame many an American sandwich-shop—alarm-clock—bazaar that specializes in prescriptions. Besides those bearing Dutch and Latin labels, there were many drugs with Spanish labels, and again, many which bore the typically British nomenclature. Apparently every country's medical requirements were being met. One reason for this, no doubt, is that the lines must comply with the shipping laws not only of the country under whose flag the ship is sailing, but of each country from which it takes steerage passengers.

So both by way of complying with the law and further to serve properly the Spanish folk whose numbers dominated the passage, the ship had gone Spanish. The Dutch and English signs over doors and passageways had been replaced with signs in Spanish. The touring and third-class had Spanish cooks and Spanish cookery only. In the first-class there was both Spanish and French cuisine, with the menu printed in both languages. Our radio newspaper came out in Spanish, and on the passenger list I found myself listed as Don W. Pyle, medico abordo.

The voyage became an opportunity to observe a cross-section of Spanish life. Senors, senoras and senoritas in the first-class spoke a language enriched with gestures and facial expressions making it almost intelligible to one who did not know its words. At dinner Spanish shawls and high combs were seen among the somber habits of those in mourning for relatives who had passed away years ago. In the tourist class we saw somewhat humbler and less picturesque folk. And in the steerage the gringo medico's ideas grown out of the doctrine that all men were born free and equal underwent much revision. I saw peon families squatting on the deck as though it were native heath, eschewing the orderly table set for them and enjoying a dish of cooked potatoes from which they each picked and ate as though they were apples in a basket. One can imagine what the proverbial Dutch cleanliness suffered in the other phases of the life of this submerged tenth as they lived and moved and had their being.

The two American passengers who had taken this roundabout way to Europe against advice were having an opportunity to observe Spanish life on the inside such as they as Americans could never get in Spain itself in twice the length of time. Except from these two, and from the author of a famous post-war novel who came aboard at Havana, I did not hear my native American language. Through the Spanish conversation there filtered a little English from the Dutch officers, Dutch from the crew, some Polish, Yiddish, German, French, and some English from South American Englishmen, but Spanish sounds and gestures filled the air.

On the third day out from Havana my dinner was interrupted by a message from the hospital steward. The Yiddish wails coming from the labor room as I approached the hospital told me of the progress of events. A stewardess was already there, giving neighborly assistance, and the male nurse was presiding as a male midwife. I assured myself that position and progress was normal and took my station in a deck chair in the adjoining room and religiously observed all the injunctions against meddlesome midwifery that Nathan Jenks had browbeat into the senior medical students of my time. In a few hours a lusty neonatoric cry told me of the addition to our passenger list. I took up and finished the recessional from there and left the lady enthroned on the labor bed with instructions that her wants in the matter of food and all comforts be supplied from the first-class to her utmost wish. I fell in with the attitude that to the victor belong the spoils. The lady had won.

I sent the Polish nurse to the bridge with the news of the event so that the necessary observation of latitude and longitude might be made. The fellow could carry more of wit and drollery under a perfect veneer of military courtesy than anyone I have ever seen. The first officer, who was on duty at that time, told me the next day how the man had transmitted my message. He had clicked his heels, saluted, and said, "I have a report from the doctor, sir." "Yes, what is it?" "The doctor has found a stowaway aboard, sir." Visions of losing the premium of a four-week voyage nearly caused the

officer to jump off the bridge besides rehearsing all the expletives he had learned in his nautical career. When he heard the more scientific explanation of the find his relief was so great that he laughed joyously as the nurse again saluted, clicked a snappy about-face and departed in solemn military manner.

News of the birth spread through the ship rapidly and maternal interest was all agog. When the expectant father and mother had been asked for a layette they had sadly iterated that they were poor and that they had none at all. So the ladies bountiful aboard came with gifts of clothes skillfully made over from garments that could be spared. Not until we approached Rotterdam did the prenatally provided layette come to light out of the depths of the patient's own luggage.

The elderly senor who had hoped to see his native Spain before he died, and a babe in arms who had come aboard suffering with an enteritis, which is not uncommon among children in the tropics, succumbed before we reached port. The bodies were cared for according to regulations internationally accepted for cases where burial at sea is not carried out. They were imbedded in sawdust soaked with a solution of bichloride of mercury and were laid in metallic coffins which were then hermetically sealed with solder. The Spanish doctor who was aboard in compliance with Spanish law protecting its citizens traveling third-class offered to embalm the body of the senor if the friends of the deceased desired that service. This seemed peculiar to me and excited my curiosity sufficiently to invite a discourse on the subject, each of us using worse than broken French, the only lingual meeting ground we had. It ended with my being convinced that being embalmed by a member of the medical profession is another old Spanish custom —new to me.

Landing at Vigo, our first port, satisfying the official dignitaries of our fitness to pass quarantine was attended with proper Spanish eclat. Our passenger list was large and varied as to class and condition. Besides the usual group of Spaniards in business in the Americas there were those who had been political refugees and also those who would rather suffer unemployment in their native Spain than in the new world, and finally merchants who believed that there might be good fishing in troubled political waters. At the last and chief port, Santander, we were very rigidly inspected. We had carried nearly eighteen hundred in passengers and crew, circumstances under which we could be suspected of having fallen short of meeting the regulations. I was asked to conduct the chief of the Spanish sanitary service through my hospital. His attitude at first did not impress me as being generous. I was asked to produce various instruments by way of checking our equipment as his assistant named them. It required rapid cerebration, for instance, to catch the Spanish term for intubation set and find a Dutch, French or German term for it by which the hospital stewards could recognize and produce it before we were marked zero on that part of the examination. However, after I had led him through all the rooms reserved for the Spanish citizens traveling third-class who might become sick he beamed his gratification and uttered an approving "muy bien." The ship's brown cat crossed our path just then. Glad of an opportunity to change the subject without appearing abrupt, I called his attention to the *"gato obscuro"* with mock nonchalance. Had it been another animal and another color the subject would have been outside of my Spanish vocabulary.

Leaving this last port of Spain, we passed the palace of the erstwhile Alonzo. I had learned the Spanish words *"se alquila"* by seeing so many "for rent" places in Havana. I gestured towards the castle as I repeated these words to the Spanish doctor, who was sharing the rail with me. He managed to tell me with Spanish vehemence that soon this building and its grounds would be a park for the poor and that he was looking forward to the moment when he might rip the crown insignia from his uniform.

Our next port was Plymouth. At British ports the letter of the law is carried out. Here the quarantine officer will not board the boat until he sees the ship's surgeon at the gangplank. I found it a pleasure to deal once again with a medico who spoke English, the more so when I found that he had served in the North Russian expedition during the World War. We did not have to fill the occasion with remarks about the present weather. The British rules, while exacting, allow for excellent coöperation; for instance, their ports are the only ones where quarantine and customs officers will meet ships at any time of the night. The

courtesies of the occasion include an order on the bar, but rarely are cocktails or wines called for. The opportunity is seized to have Dutch beer, which they admit has a surpassing flavor. The technicalities met, and the documents handed over, our chat ends when the whistle warns of the tender's departure. We exchanged cheerios and the doctor and the purser's staff returned to their cabins while the channel crossing to Boulogne is made and resume their interrupted sleep. At the French ports little is exacted of the ship doctor. It suffices to have ready in the purser's office a signed statement to the effect that there is no cholera, yellow fever, or bubonic plague aboard.

A few hours more and we reach the shores of Holland, where we proceed cautiously up the large sea canal and into the Meuse, hoping that if we land near midnight it will be after midnight so as to draw another day's sea premium for an infinitesimal bit of time on duty. Here, too, the formalities with officialdom are few. The American doctor on the Dutch steamer ceases to be a doctor when the boat ties up at the pier. He does not dispute the point. Medical responsibility for the ship is turned over to the company's medical staff on the piers. The doctor's journal of the voyage is turned in, his base pay goes on plus two gilders a day, officer's food allowance, and if he leaves his address he is free to roam the dikes or to take a jaunt to Paris. My first layover gave me ten days near the end of the tulip season in Holland. The others were but of scant five days long, with the exception of a sixty-day layover which fell to my lot in the autumn.

We now began the regular service. The officers congratulated me for having survived the Spanish trip as a novice and assured me that if that crowded voyage had not discouraged me life would be pleasant henceforth. The passenger list was small and made up chiefly of business folk, mostly Americans. For two months I had been hearing everything but American pronunciation and intonations; I could feel my ear drums relax with relief from the strain.

My contact with American officialdom at New York revealed the desirability from the line's point of view of having an American doctor as ship's surgeon. Through the years in which the lines were bringing immigrants of all sorts to the United States the system of documentation and defensive inspection developed. The matter of contact with medical authorities was considerably smoothed by having an American doctor deal with American doctors. Documents to be made out and signed are voluminous, the inspection is rigid, but it is all carried out in a spirit of reasonableness that delights the personnel of the purser's office, on whom all the formalities fall.

As we entered New York harbor I found myself with other Americans watching the shore with that native land feeling. I realized that they were coming to stay and were looking forward to the prospect of happy days at home. I was experiencing a bit of regret at the prospect of setting out again. But as I approached the pier that night, after an evening on Broadway, and saw the large white decks of the Volendam I realized that there would be a greater pang if she were to sail without me. I found the days in New York hot, the air stifling. I was glad when we again could put out to the healthful sea.

The happiest feature of the New York layover was the fact that here the officers all sat at one table. At sea each of us had his own table at which he played host. In New York I could listen in on the Dutch officers talking with each other. I found their discussions on world affairs and their views delightful. There was a revelation of broad basic education and understanding, a conservatism, and, most of all, a freedom from idle or frothy patriotism. Holland is well aware that it must buy the world's goods and sell its own products to the world. She believes in doing all she can to understand other nations and freely educates her youth in this spirit. At an early age they must learn English, later French and German. She says in effect, "We are a small country; proud as we are of its past history and of its culture, we do not expect the world to learn our language when it wishes to deal with us."

Among the implied duties of the surgeon on passenger ships generally is the matter of being host, or, at least, of extending hospitality in his contact with the passengers. The line which I served had no definite instructions or formulated rules, but all officers understand that they are expected to be at their respective tables regularly. On the other hand, we felt that the line would rather have us be intent on our separate responsibilities towards the ship than to qualify in the hail-

fellow-well-met milieu of the smoking-room. Beyond this the matter was left to the captain of the ship.

In this connection I found my position presenting some unexpected phases requiring some adjustment. The doctor is the only American officer on board, and the Americans, who admittedly form the valuable majority of passengers, soon turn to him as entre preneur in their relations with the ship. I had to guard against becoming a busybody, coming continually with requests to my fellow officers about matters strictly within their own departments. I learned to answer these requests from Americans by referring them to the proper officer, saying that the officer was very approachable, as indeed were all my fellow officers. Mr. Ernest Hemingway, who was the delight of my table on one voyage, overheard my answer to some such request in which I intimated that I was loath to meddle in the other fellow's department. "I suppose, doctor," he said, "that if I should see a rat and could prove that he was actually infested with the flea that carries the bubonic plague, it would be a proper matter to take up with you." To which I replied that if his observation of the rat, the flea and the microbe gave promise of the latter meeting the requirements of Koch's postulates his case would be strong and would have my heartiest attention.

This same unique position of the American doctor on the Dutch liner calls for another point of being on guard. Americans on board have an attitude towards festivity in general, often engendered by the release from getting their champagne and wines through illegal channels. Into this the American officer, with apparently much leisure, is invited. All of this is well enough for the passengers making a single voyage. But to join in this spirit of pleasure bent will not do for a series of voyages. I soon learned to assume a teetotaler attitude, eschewing fine wines which might grace my dinner and avoiding the invitation for preprandial liqueurs in the smoking-room.

Except for the matter of occasionally having to isolate fevers, little is asked in the matter of sanitation as in the army. In the first place, Dutch cleanliness does not need an American doctor's enforcement. Further, ship sanitation has been for years a matter of international regulation, and all officers are well grounded in it. There is international provision for the treatment of venereal disease and the prevention of its spread. There are hospitals in various ports where a sailor of any nationality may receive free treatment. The crew is inspected on the company's piers before each sailing from Rotterdam and before landing in New York. In none of the sixteen sailings on which I served the Volendam did I find any venereal disease. In fact, I found the term "drunken sailor," or the idea of the sailor as a patron of the brothels, obsolete, on my ship at least. Most of our sailors were husbands and fathers, a type that on land would be spoken of as industrious, good citizens.

Except in the case of continued rough weather *mal de mer* is not the chief ailment for which the doctor is called. Seasoned voyagers are often victims, and many of them have long ago despaired of relief. These and many of the novices think of seasickness as a natural concomitant of the voyage. All the cases called seasickness do not fall into one class as to etiology. After some observation of the symptomology one learns that the rush, farewell entertainment, disturbance of regular eating habits are causes of nausea that may set in the day after coming aboard. In many cases mere apprehension seems to initiate nausea and vomiting, and in still another group the temptations of the menu and the hospitable urgings of the table steward result in unguarded indulgence not compatible with an existence which is not continuously one of perfect horizontals and perpendiculars. Besides all these there is, of course, the horrible clinical entity in which even the mere raising of the head from the pillow causes all the furniture to reel and which causes the victim to implore to be put off at the first port, wherever it may be, from which he will never get on a ship again, even to take himself home.

I never resorted to opiates except when a chronic disability or a concomitant illness warranted the patient's being spared the horrors of *mal de mer*. I found that the drugs of the barbituric acid group gave relief in sleep only to have the symptoms return during the waking hours. The steerage passengers, whose open deck space was near the hospital, often called on my old nurse. He always prescribed a glass of beer to be taken slowly. I made it a point to observe the subjects of his advice, both before and after taking. I found too many of them

happy on the deck within a few hours after taking the cure to sniff in scientific scorn at his empiricism. Not forgetting that *post hoc* is not necessarily *propter hoc,* I introduced the humble beverage into the sick room of the first-class, often with results that made the patients fairly sing their gratitude.

Naturally I speculated as to what element of the brew was responsible. Was it the carbon dioxide in solution, the alcohol, or the bitter principle? My experiences with those passengers who had tried champagne had not satisfied me that even the goodly percentage of both alcohol and carbon dioxide in that beverage was very effective. The same seemed to be true of non-alcoholic carbonated drinks and of uncarbonated alcoholic mixtures whether diluted or "straight."

This lead me to experiment with bitter drugs. I found that often a few half-drachm doses of the compound tincture of gentian held in the mouth as long as possible before swallowing dispelled the nausea. Later I obtained some *anthemis nobilis,* a bitter blossom that is easily retained in the mouth and chewed. I used these last two measures in the cases where there was an acquired antipathy to beer and where I might be suspected of shifting my professional obligations to the bar stewards. I admit that all the requirements of a scientific investigation were not met in my experiments or my conclusions. Clinically, I found that the most satisfactory approach to the matter was this prescription of "bitters held in the mouth," and warning against the use of coffee and tea, especially with sugar or cream, between meals.

It was my good fortune never to encounter indications for major surgery on my voyages. Basing my management on reports of how such conditions had been met on other ships I would have met such a situation on the Volendam by impressing the doctors of medicine among the passengers into an operating room staff of nurses as well as surgeons. Had I ever wanted consultation I am sure that I could have found an average assortment of specialists aboard on any one voyage.

One unofficial duty which slowly gravitated towards me was that of editing—proof-reading, if you like—the subject matter published in the ship's daily newspaper in which the news received by radio is printed. Carefully as this is taken by the radio operator, it is the duty of the purser to prepare it for publication. The vernacular of the bleachers used in reporting baseball games was beyond him. Even in its best form it makes no sense for one whose basic instruction in English was gotten from insular sources. So the American's advice on the presentability of the phrases such as "died on second," "lifted the pill," was eagerly sought and accepted. Later the baseball news was turned over to me entirely and I assumed the title of sport editor of *The Ocean Post.*

Now, in the eyes of the Dutch officers, an American doctor may be a good physician and in many respects a scholar, but, for the reasons just given, his opinions as to what is correct English are viewed in the spirit of "English spoken and American understood." It was only after I had called their attention to some incongruities in their text and had backed up my criticism by references to Webster's Unabridged that I was allowed to pass on the language of the entire sheet.

With the coming of the winter cruise season the objectives of the passenger service are changed, producing a change in the life and atmosphere of the salons. On the transatlantic voyages there may be hilarious groups among the more sedate passengers; on the short West Indies cruises the spirit of whoopee descends on the ship. The drawing-room decorum which is found in many phases of the summer voyages is banished by the pervading spirit of a beach party. Every night is party night. A bathing-suit is proper attire on any part of the ship. The most is made of the opportunity for ultraviolet. The ship's own musicians, whose classical strains always called me to decorous dressing for a decorous dinner, are replaced by an American gipsy jazz band which calls me to a noisy dinner in a dining-room bedecked with colored streamers. I wonder what color confetti will land in my soup tonight. I hope it won't be green. Perhaps I had better take thick soup; it is not so good a solvent for the foreign bodies. Tonight there will be a pajama parade headed by the jazz band playing "Mamma don't want no peas, no rice, no coconut oil." Tomorrow, I know, the doctor's office will not serve for a consultation hour. There will be the great American trek as to a drug store for over-

the-counter aspirin, soda bicarb, argyrol and laxatives. I decide that I would again enjoy the quiet of the street-cars and the automobiles and the shrieking newsboys on Woodward Avenue.

The Volendam sails on her next cruise without me. I had never tired of watching the tugs nose her into position. Now I watch them from the pier instead of from my favorite place at the stern. I know what commands are being sent from the bridge to the engine rooms. I visualize the engineer at his post, and his adjuncts, one at each turbine control. I exchange the Dutch equivalent for Aufwiedersehn with the second officer at the stern and say good-bye to the old hospital steward whose plodding ways had been a matter of suspicion when I entered the service but on whose general dependability I had come to rely.

Now, in reflecting,

> "If I pleased to spend real wishes on
> myself—say three—
> I know at least what one should be."

—if I were allowed to relive for a few days one and only one phase of all of my experiences I would not choose two days in gay Havana, not two calm winter nights under tropical stars, not the true paradise of the beach at Nassau, nor the delight of the first trip along the steep green coast of Spain. I would not choose to spend the days in quaint sedate Holland or on the gay boulevards of Paris, nor even in the gemutlichkeit of the Vienna cafes. I should choose to visit the ship while she lay in New York harbor, to join the officers at their table, to greet them and be greeted with "bon appetit" and listen to their exchanges uttered in fine measured Dutch phrases, on subjects simple or great, hesitating to break into the picture with my English interpolations or my fragmentary Dutch. Sooner or later the skipper will say, "The food is always best when we are in port." He does not suspect, but I know, that it is the sauce that makes it good; the sauce of quiet friendly conversation arising out of the intelligent mutual understanding which these men who have known the sea all their lives have for each other.

THE EMBRYOHORMONIC RELATIONS OF THE ENDOCRINE GLANDS

II. THE EMBRYOHORMONIC RELATIONS OF THE PITUITARY GLAND TO MESODERMAL TISSUES†

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It is my object in this paper to reemphasize what I have contended for many years, that the pituitary gland has a selective action on mesodermal tissues. This fundamental fact becomes of greatest importance when disease involving the mesodermal tissues is present. Constitutional inheritance is exerted through the medium of the endocrine glands on certain tissues and in this article it will be shown that the pituitary gland influences the development and nutrition of the mesodermal tissues.

From the mesoderm are derived the following tissues:

Mesenchyme

(a) Connective tissue (all types of connective and supporting tissues).

(b) Cutis or corium—including the hair papillæ.

(c) Cartilage—bone.

(d) Dentin and cementin of teeth.

(e) Pigment cells—mesodermal.

(f) Lymph glands—lymphatics.

(g) Spleen.

(h) Blood.

(i) Blood vessels.

(j) Fat cells.

(k) Smooth muscle.

(l) Renal cells.

(m) The joint cavities, the bursæ, subarachnoid and subdural spaces and their linings.

(n) Nerve corpuscles (Pacinian corpuscles—nerve endings).

Mesothelium

(o) Adrenal cortex.

(p) Sex glands.

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(q) Striated muscles—including cardiac muscle.

(r) Pleuræ, pericardium and peritoneum.

As Fischel says, the ecto- and entoderm furnish the organs in whose development they are concerned with the epithelial portion only. They themselves (the ecto- and entoderm) are unable (with the exception of the lens and vitreous humor) to develop an organ in its entirety. On the other hand, an organ may consist entirely of mesodermal tissues for the mesoderm is able to supply the connective tissue as well as the epithelial element. This becomes of greatest importance for the embryohormonic relations of the pituitary to mesodermal tissues.

Because the pituitary influences the development and function of so many vital tissues, nature has protected this gland so that it is relatively inaccessible.

It will be noted that a division has been made of the mesoderm into a mesenchymal and a mesothelial portion. The reason for this will become apparent later on in the paper when the suprarenal cortex is discussed.

It is inadvisable to discuss the complete data which support the hypothesis that the pituitary controls the development of mesodermal tissues. It is my purpose here merely to outline some of the more obvious relationships as a detailed discussion of this gland's influence on each mesodermal tissue would be too spacious.

A discussion of the symptomatology of each mesodermal tissue found in pituitary disease does not give as clear a picture to the reader as does the composite whole but the dissection into its integral tissue symptomatology is necessary in order to show its selective action.

It is evident that according to the inheritance characteristics of the individual a part or parts of the mesoderm will bear the brunt of the pathology and symptomatology. The local "gen" is the place of least resistance according to the constitutional inherited predisposition. The German term for this tissue of least resistance is "gewebsmindenwerdigkeit."

Connective Tissue.—The influence which the pituitary gland has on connective tissue development goes hand in hand with the skeletal development. Through the agency of this gland secretion the various constitutional types are produced. The two main groups, asthenic and sthenic, are well understood on such a basis. The asthenic type with lessened pituitary activity has, of course, poorly developed connective tissue with the consequence that this lack of supportive tissue produces enteroptosis and splanchnoptosis.

Without anticipating what is to follow later on in the paper, it is apparent that the organs of resistance to disease (bone, lymphatics, blood, adrenal cortex, etc.) which are mesodermal in origin are poorly developed in the asthenic individual. He is, therefore, subject to the wasting type of disease and in addition he has not the ability to form connective tissue to wall off infection such as tuberculosis.

Congenital hypopituitarism results in a general lack of connective tissue development throughout the body. In the mesodermal corium the connective tissue is poorly developed and the skin is loose and able to be taken up in folds.

The sthenic type with a congenitally active pituitary has well developed connective tissue so that his organs are carried high.

Hyperpituitarism results in a great increase of connective tissue throughout the body and overgrowth of this tissue is everywhere apparent. Connective tissue tumors, such as neurofibromata, fibromas, etc., are very frequently present in hyperpituitary states. One can understand that in certain congenitally predisposed hyperpituitary individuals the connective tissue overgrowth produces, through mechanical pressure, an atrophy of the sebaceous and sudorific glands so that the condition known as scleroderma results.

The subcutaneous connective tissue in hyperpituitarism as in acromegaly may even invade the musculature, and the skin is unable to be lifted into folds. Molluscum fibrosum is frequently found in hyperpituitarism. If pituitary cachexia develops in later life, the subcutaneous connective tissue disappears and a senile appearance with wrinkling of the skin is present.

Keloid formation is frequently found in acromegaly. The white race, when acromegaly develops, has a connective tissue overgrowth such as seen in the negro (thick lips, thick corium, etc.) and assumes negro characteristics. The negro apparently presents to an exaggerated degree the two main types of constitutional development, the asthenic and sthenic.

In experiments on rabbits, Osius and I were able to uniformly produce a fibrosis of the lungs by injection of posterior lobe extract. Putnam, Benedict and Teel, in producing experimental acromegaly in the dog, found an increase of connective tissue in all organs.

Cutis or Corium.—The derma or corium of the integument is developed from the mesoderm and as such is poorly developed in hypopituitarism, whereas it is overdeveloped in hyperpituitarism.

As has been stated in the article on the thyroid gland, the central shaft and bulb of the hair are ectodermal in origin whereas the hair papilla and outer sheath are mesodermal in origin. The nutrition of the hair is, therefore, dependent upon the *mesodermal papilla.*

The influence of the pituitary secretion on the mesodermal papilla is seen in disturbances of this gland. In hypopituitary states the hair development is very sparse. Adult men who have this condition seldom shave because they have no beard and also have very little hair on the body. The eyebrows, eyelashes, pubic, axillary and body hair is very sparse and of a fine texture. In pituitary cachexia the hair all over the body falls out.

Hypophysectomized puppies retain the lanugo form of hair development.

In contrast to hypopituitarism, hyperpituitary states are accompanied by a dense growth of hair all over the body—bushy eyebrows, coarse beard and generalized body hirsutism. This type develops baldness later on. An explanation of this type of baldness may be found in anatomical relations. The connective tissue increase which accompanies hyperpituitarism would, in time, interfere with the blood supply of the scalp. The scalp having little subcutaneous fat and being in such close proximity to the skull, there is very little room for play and the connective tissue would cut off the hair papilla's blood supply.

Bengston's recent work on certain types of baldness treated with benefit by anterior pituitary injections is interesting.

Leopold, Levi and Willorts noted a marked increase of hair in individuals with alopecia when fed pituitary tablets.

Aschner noted in one case of generalized alopecia that feeding pituitary tablets resulted in a rapid change in hair development (rapid falling out of the hair followed by regrowth).

The importance of the pituitary relationship to the mesodermal hair papilla is apparent in many conditions.

In hyperpituitarism the opposite of hypopituitarism is seen. Men who have this condition possess unusually dark, coarse heavy beards. The hair of the body is everywhere well developed so that a condition of hirsutism results. It is interesting that from an empiric standpoint this has been associated with virilism and muscular strength. This, as we see, has a foundation in scientific facts. As we know and as will be emphasized, the pituitary influences the development of the skeletal, muscular and sex gland systems and, therefore, the hyperpituitary individual is well developed along these lines. It is my belief that the secondary sex characteristics are dependent *primarily* on the pituitary gland and only *secondarily* on the sex glands themselves. One may cite as an example the change in the voice due to enlargement and thickening of the mesodermal laryngeal cartilage at puberty. Lack of pituitary secretion at this time results in a retention of the boyish voice and underdevelopment of the sex glands, so that the male characteristics are recessive and the female predominant. Women with hyperpituitarism usually have hair on the lips, chin and a male distribution of hair. Likewise they have deep bass voices. This is frequently seen at the menopause.

The hirsutism of hyperpituitary conditions shows how well this fits in with the particular athletic constitutional type. The hirsutism seen in suprarenal cortex, ovarian and testicular tumors is due to pituitary involvement. Elsewhere, I will report the experimental work which is being undertaken to prove this.

Of further interest in this regard to hair development and the pituitary are the experiments of Iscovesco and Osius and myself. Iscovesco noted after feeding rabbits adrenal cortex lipoids that there was an increased growth of hair. Osius and I showed that feeding rabbits with a high fat diet resulted in a peculiar shagginess of hair. Without entering into a discussion concerning an obvious relationship between pituitary and fat metabolism, it is reasonable to suppose that feeding these fatty substances

would stimulate the pituitary with a resulting increase of hair growth.

Many skin diseases involving the corium are probably due to pituitary disturbances.

Recently Pillsbury has shown by experimental studies, that a specific carbohydrate metabolism of the skin may be observed. He says that lactic acid, an important product of carbohydrate metabolism, is normally present in the skin. The skin of animals previously injected with dextrose forms lactic acid in vitro in increased amounts.

These studies as well as the opinions of Kaposi, Bloch, Jadassohn, show that some decomposition product of carbohydrate material is the agent most probably concerned in the production of pathological changes in the skin in association with disturbed carbohydrate metabolism.

The relationship between the pituitary and carbohydrate and fat metabolism, as the most recent work shows, is, of course, of great importance in this regard. We may logically associate the pituitary gland and its known influence on carbohydrate and fat metabolism with the metabolism of the mesodermal corium. Particularly is this true in diabetes mellitus.

The details of such a study would be most interesting and profitable. Therapeutic weapons would, of course, be provided as a result of such studies.

Cartilage and Bone.—The relationship of the pituitary to bone and cartilage development is a very evident embryohormonic influence. In a general way we may say that hypopituitary states result in lack of bone and cartilage development, whereas hyperpituitarism produces increased bone and cartilage development. The faulty skeletal development in hypopituitarism has been described and emphasized by many writers. If the condition begins in early life or is congenital, pituitary dwarfism results. In later life, but still in the growing period, the stature will be diminished and growth may become arrested. In the male, the bony development assumes feminine characteristics and make-up, particularly in the pelvis, long hands, etc. Genu valgum is often present. The terminal phalanges show persistent epiphyseal lines. In the male, the larynx retains its puerile character so that empirically the high pitched voice is rightly associated with femininity. Many bony changes such as coxa vara are the result of pituitary insufficiency. Hyperextensibility of the joints is usually seen in hypopituitary conditions of the congenital type.

Experimentally it has been proved that hypophysectomy results in a delayed ossification and marked retardation of bone development. Both clinically and experimentally pituitary insufficiency produces a delay in bone nuclei development and dwarfism is the natural result.

Smith, by hypophysectomy in rats, has produced the reverse picture of acromegaly. Among the changes found was a stunted skeletal development. Putnam, Teel and Benedict were able, by injection of anterior pituitary extract, to produce a skeletal overgrowth in a dog which was identical with human acromegaly.

In hyperpituitary states there is a marked increase of bone development and this assists to a great extent in diagnosing the condition. Gigantism and acromegaly are two examples of pituitary overactivity. In a general way it may be said that acromegaly results from hyperpituitarism after ossification is complete, whereas gigantism results when the condition is present before ossification is complete.

Cushing, Lewis and many others have described the bone changes seen in hyperpituitarism. Exostoses and bony overgrowth are commonly found in hyperpituitarism. This overgrowth is also shared by the cartilaginous system, the ears for instance become very large, as well as the cartilage of the nose, larynx, etc.

The embryohormonic relationship of the pituitary secretion to the osseous and cartilaginous systems suggests an etiological relationship of many pathological states of these systems. Osteogenesis imperfecta, fragilitas ossium, otosclerosis, some forms of osteitis fibrosa cystica and many other diseases of these tissues should certainly be studied along these lines for it is but logical sequence of reasoning that, coupled with a constitutional predisposition, the pituitary relationship to these tissues furnishes a basis for etiology.

My purpose for the present is merely to show the embryohormonic relation of the pituitary to the mesenchymal, osseous and cartilaginous systems. Its application to the Neanderthal man and other anthropological data is, of course, self evident. In addition one can readily see the practicability of studying mesenchymal diseases such as fragilitas ossium with otosclerosis, blue scle-

rotics and not infrequently other combinations of mesenchymal tissue involvement such as the blood with hemophilia and fragilitas ossium. While it is not my purpose to enter into a discussion of otosclerosis, the importance of the pituitary to the mesodermal portion of the auditory organ should be stressed. In studying patients afflicted with otosclerosis it was noted that they had certain features in common: familial tallness, menstrual disturbances in the women, hirsutism in the male—these being hyperpituitary effects.

The selective action of the pituitary secretion on mesodermal tissues is the keynote for understanding the etiology of otosclerosis. Overactivity of the pituitary in predisposed individuals will result in otosclerosis.

The statements of Crowe and Polvogt are very important. They say: "Mesenchyme may persist in certain portions of the middle ear and mastoid throughout life. The niche of the round window, the epitympanum or attic and the mastoid antrum are the usual locations. Histologic study of the temporal bones of the cases reported demonstrates an abnormal condition in the middle ear (a large amount of embryonic tissue) and an atrophy of the nerve and organ of Corti in the inner ear which is limited, however, to the lower half of the basal coil." They also state that persistent embryonic tissue in the middle ear in adult life is not rare. It is quite obvious that in these individuals overactivity of the pituitary would produce otosclerosis.

Dentin and Cementin of Teeth.—Pituitary hypofunction, particularly the congenital and infantile types, results in poor development of the dentin and cementin of the teeth. In the more serious hypopituitary conditions of the adult, such as cachexia hypophyseopriva (Typus Simmonds) the teeth crumble and decay rapidly. During the developmental period of the dentin and cementin, it is of course obvious that a severe hypopituitarism will result in serious dental disturbances with persistence of the first set of teeth. These are badly formed and decay very rapidly. Second dentition is rare in these severe forms. Coincident with this the jaw and the rest of the osseous system does not develop properly.

Hyperpituitary individuals have very beautiful teeth even without the usual dental care. Sthenic negroes whose pituitary is very active have beautiful teeth. It is remarkable how well this works out clinically and gives a clue to hyperpituitarism.

Pigment Cells.—It is a certainty that at least some pigment cells are formed in the mesoderm. The mesoblastic origin of all pigment has much to favor it. In fact it would seem that pigment formation is a metabolic process and as such the mesoblastic origin hypothesis is undoubtedly the strongest.

The more the problem is studied, the more is one convinced that the mesoderm is responsible for all pigment. Since the mesoderm does give off, at least some, if not all the pigment cells, my present purpose is to bring the pituitary in relation with these mesodermal cells. The article on the pituitary and suprarenal cortex as related to pigment formation discusses the problem more in detail.

Certain facts immediately show that there is a definite relationship. Hypophysectomy in the frog results in an "albino" and extract of the posterior lobe injected into the "albino" frog skin produces a return of the normal color. In other words, the posterior lobe is a melanophore stimulant. This has been shown by many workers. (Hogben and Winton, Spaeth, etc.)

From a practical standpoint it is to be noted that hypopituitary states result in producing a light colored skin. The hypopituitary individual has an alabaster-like skin due to the lack of pigment. No doubt the vitiligo in some individuals is due to a lack of pigment in certain areas associated with a hypopituitary function. It is rather interesting as I noted that vitiligo is seen in people whose hair is streaked with gray and whose hair is or has been dark.

If one takes the trouble to study these patients one can find small fibromas in the skin, telangiectases and other mesodermal tissue involvement.

In contrast to hypopituitarism with the lack of pigment formation, the hyperpituitary individual has an increased pigment.

It is interesting that the Caucasian race developing acromegaly takes on the characteristics of the negro with his dark pigment. Dr. Max Ballin tells me that one of his patients who had been a blond previous to the development of acromegaly, became a decided brunette after its inception.

The pituitary is probably the responsible factor for the pigmentation of pregnancy.

Other alterations of pigment found in pregnancy, such as chloasma, are to be understood on the same basis of pituitary activity.

Of practical clinical importance are some observations which I made on cases of recurring iritis who had been unrelieved by therapy directed to foci of infection. These cases show a definite pituitary disturbance. Details of these iris findings in association with pituitary disturbances will be reported elsewhere. In a recent article on singular manifestations of pituitary tumors van Goor and Schaly noticed tumors of the iris in three cases. They state that the symptom-complex of metabolic changes and eye complications in acromegaly has never before been published.

Hypopituitary individuals as a general rule have fine light hair, whereas the hyperpituitary individual has comparatively coarse dark hair.

From our present state of knowledge, we are safe in saying that the pituitary occupies an important position in pigment metabolism. It is also of great importance in this regard that the adrenal cortex (to be considered later) reflects the state of the pituitary. The adrenal cortex has for a long time been associated with pigment metabolism and attention was directed to it by the bronzing seen in Addison's disease.

As definitely proven by statistics, brunettes have menstrual disturbances much more frequently than the blond. The pituitary relationship to the ovaries is, of course, well known.

The melanophore stimulating principle of the posterior lobe, while in itself understood as a pharmacologic effect, assumes greater significance when viewed in the light of its other stimulating actions on mesodermal tissues. For instance, it causes contraction of the blood vessels, a stimulation of the renal cells, and contraction of the smooth muscle. In addition it stimuluates growth of the suprarenal cortex when injected over a period of time into rabbits.

As a general rule it can be said that dark haired women, with dark complexion and hypertrichosis, are more apt to suffer from hyperpituitarism and its consequent effect on mesodermal tissues than blondes. This is an important clinical fact and is useful in determining the activity of the pituitary. These women frequently have fibroids, and others of this group who do not develop fibroids pass through a period of too frequent menstruation and then stop menstruating prematurely. This is seen in acromegalic women who pass through this cycle rapidly because of the overactivity resulting from an adenoma.

Laparotomies on these women show that the ovaries are either degenerative in type with cyst formation or the ovaries are hard and sclerotic with connective tissue formation. Zondek was able to inhibit the normal estral cycle in animals by injecting anterior lobe substance. The ovaries after two to four weeks became huge and were filled with corpus luteum. All the follicles were transformed into corpora lutea.

Through chronic stimulation of the ovary ovulation is inhibited and sterilization results. If continued the mesodermal connective tissue infiltration results in contracting the ovary with consequent sclerosis and atrophy.

Lymph Glands, Lymphatics, Spleen, Blood.—I have grouped these mesodermal structures under one heading in order to simplify the pituitary relationship to these tissues.

It is obvious that we are dealing with tissues essential to combat disease.

A patient's resistance is, to a large degree, dependent upon the development and normal functioning of these mesodermal tissues.

Applying the embryohormonic relation of the pituitary to these mesodermal tissues in question, it is natural to assume that a congenital pituitary insufficiency will result in a poorly developed reticulo-endothelial system. Such is the case clinically. It is best illustrated in the anencephalic monster with an entire absence of the pituitary. The monsters have all the mesodermal tissues greatly underdeveloped and some are missing entirely. The bones, adrenal cortex, kidneys, heart, blood vessels, sex glands, etc., are either undeveloped, malformed or missing. The lymph glands are everywhere poorly developed. Kaufman says that the spleen may be absent or malformed in anencephalus. The blood shows a severe grade of anemia with embryonic forms. The blood vessels and heart are all hypoplastic, the latter being very small and poor in muscle fibers.

Experimental hypophysectomy duplicates these findings in, of course, a lesser degree. For instance, Smith, Evans and others by hypophysectomy in animals were able to show the spleen, adrenal cortex, bones, etc., were small and poorly developed.

Young hypopituitary individuals also have this hypoplastic condition. For this reason, their resistance to disease is poor.

Anemia is the rule in hypopituitarism and there is a lessened blood volume.

Contrasting this with hyperpituitary states it is noted that the hematopoietic system is hyperplastic. The spleen is very large and the reticulo-endothelial system of the liver is hyperplastic. The blood volume is often increased. Polycythemia with cyanosis is a frequent finding in acromegaly. I, with others, am reporting the results of our experiments showing the pituitary's relation to polycythemia. Autopsied cases also will be reported.

Likewise, the adrenal cortex, which is concerned with resistance to disease, is markedly hyperplastic in hyperpituitarism.

Since the pituitary has a definite relationship to the hematopoietic system its association with certain blood dyscrasias and splenomegaly should receive much more attention. The beneficial effects of cod liver oil and sunlight treatment could well be understood by stimulation of the pituitary through these agencies.

Blood Vessels.—The pituitary's relationship to blood vessels is constantly becoming more evident. Particularly is this true of the posterior lobe. Krogh's experiments on frogs led him to conclude that the posterior lobe secretes a hormone in low concentration which maintains capillary tone. At a recent German Gynecological Congress, Fauvet reported that by repeated injections of posterior lobe substance into rats he was able to produce the identical pathological anatomical changes in the liver, kidneys and brain as that found in eclampsia and nephritis of pregnancy.

Hoffmann and Anselmino, at this same Congress, reported that they isolated a substance from the blood of nephritics and eclamptics which gave the identical reactions of posterior lobe substance. They definitely proved that in these cases there is an increased posterior pituitary secretion.

1. This substance produced at first a marked antidiuresis, almost to the state of anuria, then followed by a period of marked diuresis.

2. During the period of antidiuresis an abnormally high chloride concentration is present.

3. Physical-chemical reactions also proved that this substance was posterior lobe secretion.

4. This ultrafiltrate substance was characterized by sensitiveness to alkali, like posterior lobe secretion.

5. Both are absorbed by talcum and both are destroyed by ultra violet rays.

6. Furthermore, from nephropathic patients and eclamptics in whom there was an increased blood pressure, the blood serum gave a substance which raised blood pressure. This substance when injected into animals raised the blood pressure. The second injection, like the posterior lobe hormone, does not raise the pressure as high as the initial injection.

Only one difference was noted, the commercial preparations are effective in raising the pressure only by the intravenous route, whereas Hoffmann and Anselmino's substance was effective by the subcutaneous route as well.

7. In contrast they found that the ultrafiltrate of nonpregnant and pregnant normal women did not produce these reactions. Interesting in this regard is the work of Draper, who found that the hypertension-nephritis group of pregnant women had a skeletal measurement whose increase was precisely along the same line as that found in acromegaly and gigantism.

Osius and I produced severe arteriosclerosis by feeding rabbits a diet high in fat and by daily injections of posterior lobe extract. The summary of the article was as follows:

"Either fat diet alone or pituitrin injections alone caused hypertrophy of the suprarenal cortex. The two in combination caused a notably greater hypertrophy. Similarly, marked arteriosclerotic changes were noted in the aortas of those rabbits receiving combined fat and pituitrin treatment. Lesser degrees of involvement were noted following either treatment singularly."

The embryohormonic relation of the pituitary to mesodermal tissues is offered as a reasonable explanation of the relationship shown."

Hypopituitary individuals have low blood pressure. Due to the lack of capillary tone there is acrocyanosis. They bruise very easily.

On the other hand, the sthenic type of hyperpituitary individual has well developed mesodermal, osseous and muscular systems and is subject to hypertension.

By assuming that the pituitary is too active in diabetes mellitus, certain forms of nephritis and hypertension of the menopause, we will have a better understanding of their production. It is interesting that hyperplasia of the mesodermal tissues is usually accompanied by hypertension with hypercholesterolemia. For instance, fibroids, polycythemia vera and so-called myoma heart, are associated with hypertension.

Tuberculosis and hypertension are not a common combination and when tuberculosis is present it is usually of the fibroid type. This is exactly what would be expected, for overactivity of the pituitary does not result in the asthenic habitus, but in the sthenic type with good connective tissue and hematopoietic reaction.

Acromegaly and gigantism are accompanied by arteriosclerosis and hypertension.

Hyperpituitary states should result in blood vessel hyperplasia and this is true clinically. The plethoric, hirsute, muscular individual suffers from hypertension and hypermetabolic disturbances.

It is apparent that only a few points of this interesting pituitary and blood vessel relationship have been touched upon.

Studying the pituitary-mesoderm relationship as a composite whole gives us a better picture of the problem.

With all the facts which we possess concerning hypertension, it is strange that the problem is not viewed from the standpoint of the pituitary-mesodermal relationships for we possess a host of clinical, experimental and pathological facts which force one to the conclusion that the pituitary is responsible for the development of the mesodermal tissues and this gland has the most important relations to these tissues. Obviously, I do not wish to imply that each time a mesodermal tissue is involved the pituitary is the etiological factor.

Smooth Muscle.—The influence which the pituitary exerts on smooth muscle is, in a measure, shown by the pharmacologic action of posterior lobe extract which produces contraction of this muscle (bladder, uterus, intestine, etc.). This in itself would be of little significance unless supported by clinical and experimental evidence. Congenital hypopituitarism is accompanied by underdevelopment of smooth muscle, evidenced, for instance, in the female by a persistently infantile uterus. In addition, the smooth muscle of the intestines, bladder, etc., is poorly developed. This we find exemplified in many clinical hypopituitary states. Hypophysectomized young animals have underdeveloped uteri, intestines, etc.

Hyperpituitarism should, by the same line of reasoning, be accompanied by a hypertrophy and overdevelopment of smooth muscle. Clinical and experimental proof of this has been furnished. Hyperpituitarism in women is usually accompanied by uterine hypertrophy, to the extent of fibroid formation. Cushing and his associates have shown that concentric enlargement of the uterus is found in large women. This condition is often mistaken for fibroid formation.

Furthermore, Putnam, Teel and Benedict were able to produce a marked hypertrophy of a canine uterus by a series of anterior lobe injections. Evans, Zondek and others have likewise produced this enlargement of the uterus.

The smooth muscle of the intestines also hypertrophies to an enormous degree. This has been shown both by clinical and experimental work. It is stated by some that the peristalsis of the smooth muscled intestine is in a measure controlled by posterior lobe secretion, this being stated, of course, with reservations, since there are obviously other factors.

Renal Cells.—The association between the pituitary and renal cells has been known for some time and it is not my object to discuss the varying opinions expressed concerning the effect of the pituitary on this mesodermal tissue.

That there is a definite and intimate relationship is at once apparent to any one who studies the literature. The clinical fact that diabetes insipidus was found to be associated with lesions of the pituitary and that posterior lobe injections modified the course of this disease called attention to the pituitary-kidney relationship. It is also not the object of this paper to discuss the hypothalmic-kidney relationship as to whether it is primarily hypophyseal or not. Certain clinical and experimental facts prove beyond question that the pituitary is primarily responsible for the development, at least, if not the function, of the renal cells. The much cited anencephalic monsters with anomalies of the pituitary have various anomalous development and aplastic conditions of the kidney.

As additional evidence, we have the experimental hypophysectomy in young animals which results in unusually small kid-

neys. Smith and Evans, for example, have found this to be true. Dandy and Reichert also have produced the small kidney experimentally. Hypopituitary individuals have very small kidneys. Contrasting hypo- with hyperpituitary states we find, as would be expected, marked enlargement of the kidneys. In acromegaly there are recorded huge kidneys, four to five times the normal size, with enormous glomeruli. Putnam, Teel and Benedict produced this experimentally in their case of canine acromegaly.

Furthermore, there is evidence to show that the polyuria of vascular nephritis is due to the pituitary. Skubizewski, studying the microphysiology of the pituitary in connection with polyuria in parenchymatous idiopathic nephritis, came to the conclusion that the polyuria may be referred to the pituitary. There is a relation between an increase of basophile leukocytes with deep penetration in the posterior lobe of the pituitary and hyperfunction of these cells. Hoffmann and Anselmino's work previously cited on eclampsia and nephropathy is particularly applicable in this regard.

The discussion as to whether posterior lobe hormone stimulates or retards the renal cell function would seem answered by the former, for their work shows that antidiuresis is followed by marked diuresis.

I am of the opinion that the polyuria of diabetes mellitus is to be referred to the pituitary just as is that of chronic nephritis.

The relationship of the pituitary to diabetes insipidus is also important argument for the pituitary's influence on the mesodermal renal cells.

Nerve End Corpuscles.—The relationship between the pituitary and the mesodermal nerve end corpuscles is very interesting and furnishes us with a reasonable explanation of acroparesthesia which accompanies hyperpituitarism. Borak, in studying the origin of acroparesthesia, says that acroparesthesias are a constant symptom of acromegaly with and without normal menstrual flow and are likewise an almost constant symptom of the menopause.

As in acromegaly, there exists in the climacterium an eosinophile cell hypertrophy of the pituitary. He based his observations on 150 cases of acroparesthesias.

The sensations in the fingers or toes are described as crawling, tingling, numbness, crawling of ants, etc. Most frequently these sensations are present at night. Acroparesthesia is found most frequently in women.

Interesting is the fact that I have observed acroparesthesia following within a few minutes after injections of "antuitrin," a form of anterior lobe substance.

The thought suggests itself that the state of the pituitary may be responsible for many skin conditions involving the nerve endings. Among these would be angioneurotic edema, urticara and others. Studies along this line should certainly be made and the reader is reminded of the statements made earlier in the article between the relationship of the pituitary, mesodermal corium and carbohydrate metabolism.

Joint Cavities, Bursæ, Subarachnoid and Subdural Spaces and Their Linings.—The relationship between the pituitary and the joint spaces (synovial membrane) brings immediately to mind joint diseases, particularly arthritic conditions. The large group of non-infectious or so-called endocrine arthritis fall into this relationship. It is well known that women at the menopause, when the pituitary hypertrophies, are especially prone to suffer from arthritis. As Pemberton and others have shown, arthritic patients have a lessened tolerance for sugar, just as hyperpituitary patients have. It not infrequently attacks women of the goiter, fibroid, cholelithiasis, hypertension group, in other words, the hyperpituitary type.

In contrast to this group is the statement of Stiller that his asthenic patients have an immunity to gout, diabetes, chronic rheumatism, chronic nephritis, degenerative heart and vascular diseases and practically never die of cardiac dropsy, sudden cardiac failure, cerebral hemorrhage, and seldom suffer from angina pectoris or a high grade arteriosclerosis.

Individuals of the sthenic group who suffer from arthritis have their supposed foci of infection removed without benefit to their arthritis.

It is, of course, foolhardy to say that foci of infection do not cause arthritis, but certain facts suggest that the medium through which they produce the arthritis is by the effect of bacterial toxins on the endocrine system. Certain it is that with all the exhaustive work which has been done on arthritis, the actual discovery of bacteria in the joints of arthritis has proven sadly disappointing. Hormonal stimulation by chem-

ical toxins would result, among other things, in pituitary activity with stimulation of synovial membrane growth.

The mechanism of synovial membrane growth is the same whether that be induced by bacterial toxins or by hormonal imbalance. As stated previously, when the ovarian function ceases, with consequent pituitary enlargement, then arthritis frequently develops.

Of interest along this line are clinical observations in treating certain cases with anterior lobe hormone, the patients complained of joint pains and those who already had arthritis became decidedly worse. A sufficient number of cases have been observed so that the "long arm of coincidence" can definitely be ruled out.

Furthermore, Putnam, Benedict and Teel's experiment on canine acromegaly show that anterior lobe hormone produced a form of arthritis. The photograph of the patella shows that the injected animal's patella is at least twice the size of the control animal and "bears many osteophytes."

In acromegaly, arthritis with spurs is the usual finding. The spine also shows arthritis with kyphosis.

Youthful hypopituitary individuals have hyperextensibility of the joints and frequently call themselves "double-jointed," because of the extreme flexibility of the joints. This is, or course, in marked contrast to arthritis with the limitation of motion due to swelling of the synovial membranes and bone changes.

Subarachnoid and Subdural Spaces and Their Linings.—The relationship between the pituitary gland and the subarachnoid and subdural spaces is a very interesting and important one. As has been shown by Weed and Cushing, posterior lobe extract increases the output of cerebrospinal fluid by stimulating the choroid plexus—a mesodermal structure. If the pituitary influences the choroid plexus and covering of the brain then it becomes of clinical importance in certain cerebral conditions as well as in pituitary diseases. An increase of its secretion would result in the production of increased cerebrospinal fluid and stimulation of the subarachnoid spaces. Headache would naturally be the result. This would explain the frequent headaches found in pituitary disturbances.

Quite naturally one would apply such relationships to certain diseases associated with increased intracranial pressure. I refer particularly to migraine and epilepsy.

Kraus states that in cases of chronic increased intracranial pressure the pituitary weight is frequently increased by strumous enlargement of the anterior lobe. The enlargement is due to an increase in gland cells. In one-third of the cases there is a distinct proliferation of the chief cells in the basilar portion of the muscular layer and the neighboring portion of the medullary substance to the extent of adenomatous hyperplasia. Less frequently proliferation of the basophils of the anterior part of the anterior lobe is present.

In metastatic brain tumors and brain abscesses, pituitary enlargement is usually not present. Very frequently (84.5 per cent) there is associated an excessive cystic degeneration of the ovary.

In brain tumors of men and women increased Prolan (anterior pituitary) secretion is found in the urine.

The enlargement of the pituitary previously described may account for the Prolan found in the urine of these cases.

Ventra also describes a tumor of the frontal lobe associated with acromegaly in which the pituitary was intact.

In regard to epilepsy and the pituitary the beneficial influence of the ketogenic diet may well be understood on the basis of slowing up the pituitary function by lessening carbohydrate and fat metabolism.

Salmon has made some interesting studies on the relationship between the diencephalic (infundibular) neurovegetative apparatus and epilepsy. The author's main arguments are:

Demole's experiments with the injection of calcium and potassium salts into the region of the tuber cinereum have shown that the former causes muscular relaxation and sleep, while the latter causes motor agitation and epileptiform convulsions; Cyon Horsley showed that the slightest electric stimulation of the hypophysis induces convulsions; observations of Muller and Hogner showed that generalized tonic convulsions may result from sudden hypertension in the third ventricle; an epileptic seizure is usually followed by deep sleep, indicative of the functional depression of the infundibulum; epileptic seizures subside under the influence of phenobarbital, somnifen, chloral, etc..

drugs possessing elective pharmacodynamic action on the diencephalic sleep-regulating apparatus; epileptic attacks are a frequent symptom of tumors of the hypophyseal region; the syndromes of acromegaly, hypophyseal cachexia of Simmonds, adiposogenital dystrophy and diabetes insipidus are frequently associated with epilepsy; epilepsy is often relieved by pituitary treatment; deficiency of solution of pituitary in the cerebrospinal fluid of epileptic persons has been demonstrated by Altenburger and Stern; removal of the hypophysis is often followed by epilepsy; a lesion of the hypophysis is frequently found at autopsies of epileptic persons; paroxysmal and post-paroxysmal hyperthermia in epileptic persons may be explained as the result of an irritation of the temperature-regulating center in the interbrain.

The diencephalic seat of the presumed epileptogenous center explains its sensibility to quantitative and qualitative changes in the cerebrospinal fluid. Cortical and striothalamic lesions, by reflex action, may cause overstimulation of the hypothalamic neurovegetative centers, with resulting generalized convulsions.

Adrenal Cortex—Fat Cells.—Elsewhere I have shown that the adrenal cortex reflects or mirrors the state of the pituitary. This relationship is one of the most definite of endocrine correlations. Briefly stated, all the available data show that aplasia or atrophy of the pituitary gland is accompanied by adrenal cortex aplasia and atrophy; whereas hyperplasia and hypertrophy of the pituitary is accompanied by similar changes in the adrenal cortex. Our experiments, (Osius, and mine) as well as those of others, show that pituitary extract injections increases the weight of the adrenal cortex.

Hypophysectomy in animals produces a definite atrophy of the adrenal cortex.

Anencephalic fetuses with pituitary aplasia have, among other mesodermal tissue hypoplasias, an aplasia of the adrenal cortex. In Cushing and Davidoff's complete autopsies on four acromegalics, all showed adrenal cortex hyperplasia and three of these had adenoma formation of the cortex. Case reports of adrenal cortex hyperplasia accompanying pituitary hyperplasia abound in the literature and this is also true of pituitary hypoplasia with an accompanying adrenal cortex hypoplasia.

The rôle of the adrenal cortex in cholesterol metabolism is as yet a disputed point but that it has some place in this metabolism would seem certain from the available data.

It is possible that the pituitary influences fat metabolism partially by its effect on the suprarenal cortex. Fat tissue, as we know, is a mesodermal derivative and as such is influenced by the pituitary. This is so well known and so definite that it is hardly necessary to cite much data. I do not wish to imply that the modus operandi is a settled issue, but the relationship is sanctioned by experience and supported by evidence, and that is sufficient for present purposes.

Elsewhere, I have shown that the suprarenal cortex has a selective action on a specialized part of the mesoderm, namely, the mesothelium. From the latter is derived the following tissues:

Sex glands.

Striated muscle including the specialized cardiac muscle.

Pleura, pericardium and peritoneum.

Since the state of the pituitary is reflected in the adrenal cortex, then the tissues under the latter's control would show the symptomatology and pathology in diseases of the pituitary.

Of course the severer the degree of pituitary pathology and therefore adrenal cortex pathology, the severer will be the mesothelial tissue pathology.

Primary pathology in the adrenal cortex, congenital in nature, produces the greatest changes in the mesothelial tissues. Likewise, primary hyperplasia in the adrenal cortex produces marked hyperplastic changes in these tissues.

That the pituitary influences the ovarian and testicular tissues is so well known that it is needless to enter into any discussion. Since Evans and Aschheim and Zondek's work on the pituitary-ovarian relationship a vast amount of work has been done which proves beyond doubt that the pituitary is the motor of the ovary. This is also true of the pituitary-testicular relationship.

Furthermore, the evidence shows that the corpus luteum of the ovary acts as a check on the pituitary, whereas the interstitial cells of the testicle have an analogous function in the male.

For further details concerning the adrenal cortex and mesothelial tissue relationship, the reader is referred to other articles which take the data up in detail.

Striated Muscles (including cardiac muscle).—Hypopituitary conditions are accompanied by poorly developed striated muscles as well as a hypoplastic cardiac muscle. The asthenic individual illustrates this. In hyperpituitarism the voluntary muscles are overdeveloped and, as Engelbach says, the hyperpituitary individual has very strong muscles being well developed without the aid of exercise. The cardiac muscle is much enlarged. Putnam, Teel and Benedict experimentally produced in the dog enlarged voluntary and cardiac muscle by injection of anterior lobe extract.

Deuticke found that after total extirpation of the pituitary in frogs, usually there may be observed a muscle weakness which may be demonstrated by isotonic and isometric spasm, accelerated fatigue, and a decreased functional capacity of the gastrocnemius. In animals continuously treated with anterior or posterior lobe preparations, in the majority of tests, the results demonstrable on transversely striated muscle show extensive compensation for the hypophysectomy. No increased functional capacity could be demonstrated in tests with pituitary extracts in the gastrocnemius of healthy normal frogs. Pituitary cachexia is accompanied by weakness almost as great as that seen in Addison's disease.

Pleura, Pericardium and Peritoneum.—It is only reasonable to suppose that since the pituitary gland contains the growth hormone and since it influences the mesodermal tissues, the mesothelial pleura, pericardium and peritoneum keeps pace with the development of these tissues. The hypopituitary individual would, therefore, have these tissues commensurately underdeveloped whereas in hyperpituitary conditions these tissues would be well developed.

Naturally hypodevelopment would necessarily be congenital in origin.

SUMMARY

The pituitary gland has a selective action on mesodermal tissues. Through its influence on these tissues this gland is responsible for the constitutional type an individual will be.

Illustrative of this, is the well known influence which the pituitary exerts on the mesodermal skeletal system.

The embryohormonic relation of the pituitary to mesodermal tissues furnishes an understanding of this gland's many sided activities.

MICHIGAN'S DEPARTMENT OF HEALTH

C. C. SLEMONS, M.D., Dr.P.H., Commissioner
LANSING, MICHIGAN

TYPHOID FEVER

Although much emphasis has been given in this column and elsewhere to the steps necessary to further reduce typhoid fever, this disease is actually higher in incidence in Michigan this year than for several previous years. This unusually high typhoid rate also exists in several neighboring states to the south and east. So far the reason for the general increase over a considerable part of the country is not apparent. If the "depression" is the answer, we do not know in what manner it has aided to produce an increase. The majority of cases are accounted for in small outbreaks which evidently have no direct connection with economic conditions. The number of cases reported in Michigan from January 1 to August 27 this year is 255. Last year for this same period there were reported 183 cases.

DIPHTHERIA

Diphtheria continues extremely low. Never has there been a summer or a year with so little of this disease. Does immunization account for all of this decline? Diphtheria has in the past increased and decreased somewhat irregularly in seven to twelve year cycles. It would appear that independent of immunization we are now profiting by a "natural" decline. It is true that the decline which began in Michigan about 1922 has revealed a new low record. But will the same unknown factors which bring about a declining rate reverse again so as to give us another cycle of increasing rates? If so, we are about due for such a period.

The real test of the value of our immunization policies will take place during the next five to ten years. Godfrey has advanced the hypothesis that it is the percentage of children under five years of age in any community who are immunized against diphtheria that affects the diphtheria rate

and that immunization of school children has little effect on the total incidence for the community. Public health authorities have for some time advocated immunization of the infant at six months or a year. Can it be that we must wait until another increase in diphtheria occurs to convince the public that this disease is not conquered and will not be until it becomes a general practice to have infants protected by immunization before they are one year old?

The incidence of poliomyelitis has been lower than usual this year. Cases reported January 1 to August 27, 1932, are 53 as compared to 222 for last year during the same period and less than half that of the average year during the last ten-year period. The Michigan Commission on Infantile Paralysis is again functioning this year and supplying convalescent serum through its consultants. The physicians who are acting as consultants are not receiving any compensation from the commission.

C. D. B.

CHILD HYGIENE

Helen Linn, R.N., has resigned from the Bureau of Child Hygiene and Public Health Nursing and has accepted a position with the W. K. Kellogg Foundation. Her headquarters will be in Hastings. Miss Linn will be succeeded in the bureau by Bertha Wellington, R. N., former Home Demonstration Agent in Ottawa County. Miss Wellington is a graduate of Iowa State College; was extension worker for the Michigan State College for two years, after which she completed the nursing course in Battle Creek Sanitarium.

The series of women's classes in Genesee County conducted by Dr. Ida Alexander has been completed. During the six weeks' course in the county there was an attendance of 1,692.

A prenatal nursing program has been started in Allegan County by Martha Giltner, R.N. Miss Giltner is working with the members of the Allegan County Health Unit.

A breast feeding campaign is in progress in Monroe County, where Bertha Cooper, R.N., and Deane Rinck, R.N., of the Bureau of Child Hygiene and Public Health Nursing, are visiting mothers of young infants.

A breast feeding campaign was completed by Annette Fox, R.N., in Schoolcraft County on August 11, and a similar program was completed by Nell Lemmer, R.N., in Manistee County.

Caroline Hollenbeck, R.N., is located in Ionia County, where she is carrying on a prenatal, infant and preschool program. At present, most of her activities are with the mothers of young infants.

Julia Clock, R.N., has completed a nursing service in Ontonagon County, where she was located for three months. During that time Miss Clock had 85 prospective mothers under her supervision, in addition to which she instructed mothers of infants and preschool children.

Staff members of the Bureau of Child Hygiene and Public Health Nursing have organized bleeding clinics for post-infantile paralysis cases in Kalamazoo, Jackson, Battle Creek, Flint, Saginaw and Lansing.

ENGINEERING

The summer work in highway water supply inspection and testing has been completed, and the new yellow approval signs have been posted on 1,870 wells along the trunk line highways. About 2,425 water samples were collected, 200 more than were tested in the roadside water survey of last summer. Only preliminary figures are as yet available, and the percentage of sources found safe has not been computed.

The five inspectors of summer resorts are still in the field, but it is expected that the work will be finished by September first, with the entire state covered. Less time has been required than usual because of the assistance given by the full-time county health departments, each one having assumed responsibility for the resorts in their territory.

Efforts are being continued to persuade the few remaining towns in the state that have unsafe water supplies to substitute safe sources. Three orders have been issued by the Department within the past three weeks. The eighteen municipalities that have already received orders to improve their supplies are showing encouraging results.

ANTIRABIC VACCINE

Judging from the inquiries received from physicians, the fact that the Department now distributes antirabic vaccine to physicians free of charge is not generally understood. Antirabic vaccine (Cumming) is put up in packages of seven doses each, and for the ordinary case 14 doses at daily intervals are advised.

THE JOURNAL

OF THE

Michigan State Medical Society

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All communications regarding advertising and subscriptions should be addressed to F. C. Warnshuis, M.D., 2642 University Avenue, St. Paul, Minnesota, or Suite 1508 Grand Rapids National Bank Bldg., Grand Rapids, Michigan.

OCTOBER, 1932

"I hold every man a debtor to his profession, from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves, by way of amends, to be a help and ornament thereunto."

—Francis Bacon

EDITORIAL

DR. LE FEVRE PRESIDENT-ELECT

Dr. George L. Le Fevre of Muskegon was chosen president-elect of the Michigan State Medical Society by the House of Delegates of the 112th annual meeting. The choice is a happy one. Dr. Le Fevre has been a member of his county and state medical society since his graduation in 1891, when he located in Muskegon. He was at one time president of the Muskegon County Medical Society. For the past nine years he has been councillor of the eleventh district. The Michigan State Board of Registration in Medicine, of which he was a member, elected him chairman for sixteen years successively. For the past twenty years the new president-elect has confined his practice to surgery. With him are associated his two sons, Dr. Louis, a graduate of the University of Pennsylvania, and Dr. William, of the University of Michigan Medical School.

DR. GEORGE L. LE FEVRE
President-elect, Michigan State Medical Society
1932-1933

Dr. Le Fevre's interests have extended beyond his profession. He is also chairman of the board of the Hackley Union National Bank. When the time comes a year hence to assume the duties of office, he will perform them with ability resulting from many years' intimate experience in the medical affairs of the state and its educational institutions, as well as happy contact with the medical profession of Michigan.

PRESIDENT MOLL'S ADDRESS

The first article in this number of the JOURNAL is the Presidential Address by Dr. Carl F. Moll of Flint at the recent 112th

annual meeting of the Michigan State Medical Society. Dr. Moll finds occasion to make a number of observations which we would like to emphasize. In the first place he refers to undergraduate medical education, which is always an important subject inasmuch as the medical student of today is the practitioner of tomorrow. His medical education should be a preparation not only so far as the scientific aspects are concerned but also the social and professional phases of his calling as well. The scientific side of medicine is well taken care of by our Class A medical schools. Dr. Moll advocates a course of lectures on the subject of ethics, preferably given by men in the active practice of medicine. Of course we presume Dr. Moll uses the term "ethics" to include not only the matter of abstract *right* and *wrong* as applied to the practice of medicine, but also to include the subject of professional relationships which cannot be distinctly so classified.

He emphasizes also the fact that medical service must always remain a personal service. As a corollary, the young practitioner should be taught to look upon each patient as an individual problem and as a personality to be dealt with rather than case number so-and-so to be diagnosed.

Dr. Moll touches on the subject of the cost of medical care. It is difficult, considering the studies of the past four years, to say anything new on this phase of medicine. To recapitulate, however, the cost of medical care has risen perceptibly since many now in their prime began practicing medicine. Among the factors adding to the expense are the various diagnostic agents which have come into being in the last quarter of a century. In spite of this fact, only a trifle over a third of the reputed cost of medical care finds its way into the pocket of the family doctor. The speaker attributes a goodly share of expense to unnecessary hospitalization and the employment of trained attendants in cases where their need may be questioned. He speaks of the necessity of furnishing the great middle classes (and we might say that the so-called middle class is ever expanding) with medical attention that is within their income, so that we do not make them objects of charity. Enabling patients to keep their bills paid up increases their self-respect, for, says Dr. Moll, "the man who once accepts charity, even in dire circumstances, has lost a certain moral fineness of character that he can never regain."

Dr. Moll speaks of the "Specter" of State Medicine and dismisses the subject with the belief that the condition of state treasuries will not permit any immediate adoption of state medicine.

He goes at length into the subject of sickness insurance and concludes, "As long as we have united professional action in studying all theories and proposed plans for sickness insurance, and are prepared to meet them and direct them in an intelligent manner, we shall have little to fear in an economic way."

OUT OF BOUNDS

A correspondent sends us a card, numbers of which he says were deposited in automobiles in the town in which he practices, and asks if we think this is ethical on the part of the doctor who adopts this method of advertising his fitness to perform tonsilectomies, and also circumcisions, hemorrhoids and other surgical procedures. The circulator of these cards holds himself out to do such work for a fee of $15, still further reducing his rates if the whole family and perhaps the neighbors employ him, and so on, *ad nauseam*. There are a number of these cut rate operators in this as well as in other states. Others again make use of the loud and flaming appeal in the way of signs to advertise their skill. This is confined not only to medicine; dentistry has also been invaded by numbers who use the billboard, radio, and street cars as a means of hawking their wares. The only hope of modest, plodding, capable men in either profession is to pursue the work honestly and conscientiously and with as much skill as they can command. Those who resort to loud and raucous advertising methods are beyond the pale of organized medicine or dentistry and are therefore not amenable to discipline. This kind does not seek affiliation with organized medicine or dentistry. They are freer to pursue their calling as outsiders than were they members of county medical or dental societies.

TRENDS IN MEDICAL SCIENCE

Elsewhere in this number of the JOURNAL appears a condensed report of the presidential address of Lord Dawson, President of the British Medical Association. Lord Dawson is one of the leading internists of England whose observations on the medical situation are of more than usual interest. In the first place he notes what he terms "diseases of invasion," to be diminishing and "diseases of stress" to be on the increase. The latter include those which are the result of personality plus environment. They call for a study of the patient (psychologically) together with his surroundings. Much disability is the result of error of thought probably due to financial and social worries. Such are amenable to one's control, in which cases the patient may be often helped by advice. In the first place a comprehensive diagnosis is necessary. Sometimes the cure consists in an explanation of his condition to the patient. Less medicine will be given and more education in methods of living. The patient will go to school. His education, among other things, will include how to eat, particularly if he is a man fat and over forty. Then again, a subject for re-education is the patient in the early diabetic stage. The education in this case will include instruction in calories and food, and perhaps in the administration of insulin.

Lord Dawson takes exception to the opinion expressed by Lord Moynihan to the effect that surgery had "almost reached the end of its progress along the line which so far it has followed, that the full fruits of Lister's work have now been garnered, and that with operations now carried out upon every organ in the body little further success can be expected." He thinks that the craft of surgery has yet large fields to conquer, particularly in the surgery of the thorax, the arteries, nervous system and ductless glands.

Probably, so far as technic is concerned, surgery has attained such a high degree of perfection that we may think of it as final; however, as a science, surgery has no limitations.

AUTOMOBILE ACCIDENTS IN MICHIGAN

Commenting on automobile accidents and the responsibility of motorists in this state, the *Michigan Motor News* contains the following editorial:

"One of the distressing phases of Michigan's automobile accident situation is the financial irresponsibility of a surprising number of motorists involved. As many as twenty states have enacted legislation which tends to establish responsibility of all drivers involved in destructive accidents on state highways. Four Canadian provinces have pushed forward in protecting their citizens' lives and property by the creation of such laws. Michigan has been desultory in facing the issue and correcting it.

"According to a tabulation made by one of the leading insurance companies, only about a quarter of the 22 million passenger automobiles in the United States were insured in 1930, and the company estimates that the number of insured cars this year will show a sharp decrease. Michigan's record in the year the tabulation was made was not as good as the average for the country, our proportion of insured vehicles representing only 18 per cent of the total registrations.

"The report is disturbing because it means that the automobile driver is taking a chance with three out of every four cars he meets on the road. It means that he has but one chance in four of obtaining a satisfactory settlement in case of an accident for which someone else is to blame. It is logical to suppose the number of insured cars has decreased this year, since so many people disregard the importance of insurance at a time when their one financial background is weakened and when their normal incomes are impaired.

"With the curve of automobile accidents consistently rising, it is apparent that every effort must be made to reduce both the frequency and severity of accidents. It is to be hoped that laws compelling an automobile owner to show proof of his financial responsibility will find their way into the statute books of Michigan."

We have advocated compulsory insurance of automobiles, particularly in the matter of personal liability. Carelessness in the matter of making provision for possible accidents is brought home to the medical profession more than to any other class. Almost every member of the profession who has been called to take care of accident cases has experienced the loss of adequate remuneration or any remuneration at all. And in a great many cases the unfortunate victim of accident has no redress. Hospitals are likewise financial sufferers, particularly in the graver accidents, for often the patient has no funds with which to reimburse the hospital as well as the doctor. The toll of casualties in automobile accidents the country over resembles those of war. The right or privilege to drive an automobile should rest upon one's ability to protect the public against any accident that might result from collision. This might work hardship on some automobile owners; however, public safety should be accorded first consideration.

A CENTURY DEAD

One hundred years ago Sir Walter Scott, the Scottish poet and novelist, died. From many angles he was one of the greatest men, if not the greatest man, Scotland has produced. The hundredth anniversary of his death has called forth three timely and scholarly papers in the *Edinburgh Medical Journal* dealing with his medical history. No doubt many of our readers have perused the splendid editorial in the *Journal of the American Medical Association* of August 20, 1932.

Sir Walter, during his infancy, was the victim of infantile paralysis. Those familiar with Lockhart's Life (Lockhart was Scott's son-in-law) will doubtless recall the following account of his early illness which was written by Scott himself.

"I showed every sign of health and strength until I was about eighteen months old. One night, I have been often told, I showed a great reluctance to be caught and put to bed, and, after being chased about the room, was apprehended, and was consigned to my dormitory with some difficulty. It was the last time I was to show such personal agility. In the morning I was discovered to be affected with a fever which often accompanies the cutting of large teeth. It held me three days. On the fourth, when they went to bathe me as usual, they discovered that I had lost the power of my right leg. My grandfather, an excellent anatomist as well as physician, the late worthy Alexander Wood, and many others of the most respectable of the faculty, were consulted. There appeared to be no dislocation or sprain; blisters and other topical remedies were applied in vain. When the efforts of regular physicians had been exhausted without the slightest success, my anxious parents, during the course of many years, eagerly grasped at every prospective cure which was held out by the promise of empirics, or of ancient ladies or gentlemen who conceived themselves entitled to recommend various remedies, some of which were of a nature sufficiently singular. But the advice of my grandfather, Doctor Rutherford, that I should be sent to reside in the country to give the change of natural exertion, excited by free air and liberty, was first resorted to; and before I have the recollection of the slightest event, I was, agreeably to the friendly counsel, an inmate in the farmhouse of Sandy-Knowe. Among the odd remedies recurred to, to aid my lameness, some one had recommended that so often as a sheep was killed for the use of the family, I should be stripped, and swathed up in the skin, warm as it was flayed from the carcass of the animal. In this Tartarlike habiliment I well remember lying upon the floor of the little parlor in the farmhouse, while my grandfather, a venerable old man with white hair, used every excitement to make me crawl. I also distinctly remember the late Sir George MacDougal of Makerstoun. I still recollect him in his old-fashioned military habit with a small cocked hat, an embroidered scarlet waistcoat, with milk-white locks, tied in military fashion, kneeling on the ground before me and dragging his watch along the carpet to induce me to follow it."

Scott had a noble ambition to found a house and estate that would perpetuate his name. Abbottsford, on the banks of the Tweed, is a monument to his tireless endeavor. The story of his financial disaster with the Edinburgh publishing firm is well known, in which the author became involved to the extent of over one hundred thousand pounds. He worked until he had nearly discharged this debt before death overtook him. He died at the comparatively early age of sixty-two of cerebral hemorrhage. Never robust in health, he managed to accomplish what many men of sound physique could never attain. His career illustrated in a very vivid way the law of compensation as applied to human beings.

MEDICINE, SUPPLY AND DEMAND

Medicine continues to be an attractive vocation to the young men of this country. Many more apply for admission to the medical colleges of the United States than can be accommodated. Some have managed to overcome this difficulty by taking their medical training in Europe and a number also attend the medical schools of Canada and return to the United States to take the state board examinations to enable them to practice here. The result is an over-supply of doctors in the United States. According to recent report, Canada is said to be able to absorb only about sixty per cent of her graduates. Approximately forty per cent evidently come to the United States as internes in the various American hospitals and eventually locate here.

The Educational number of the Journal of the American Medical Association mentioned gives an interesting table showing the distribution of medical students to European and Canadian Medical Schools. In Canada, McGill University, Montreal, gets the largest number, 207, with forty graduates in 1932; the University of Montreal 27 with 5 graduates; Dalhousie, Halifax, Nova Scotia, 25 with 10 graduates.

Of those crossing the Atlantic, the University of Vienna 154 and the University of Edinburgh 109 lead in numbers. There are 1,482 students reported, of whom 113 completed the course and graduated this year.

According to the Journal of the American Medical Association those going abroad are for the most part not so well prepared to

practice as those trained in the United States as judged from their records at the various state board examinations. Those trained and receiving the licentiate of the Royal College of Physicians and Royal College of Surgeons, England, and at the University of Edinburgh all passed; of graduates of some other foreign schools the failure in the number of candidates at the American state boards was as high as 100 per cent.

The United States has already more physicians in proportion to its population than any other country in the world and the tendency is for the number to increase. During the past nine years the average number of deaths in the profession was 3,088 a year. The average number of medical graduates the same period was 3,920, an excess over the number of deaths of 832. To increase the number materially will lower the standard of living for all, as it is being painfully felt by many at present.

Not only is the increase in the number seeking to enter the ranks of medicine having a grave effect on medicine, dentistry likewise has its own troubles. In spite of this, Detroit is to have a dental college. When the supply exceeds the demand in any profession, the result is to increase the struggle for existence with consequent deterioration of the high standards set by the better members of each, and a scramble by the less scrupulous in the way of commercializing the profession.

LEGAL DEFENSE

Legal defense is a valuable feature of membership. One suit or threat of suit may cost you anywhere from $200.00 to $1,000.00 in attorney fees—an amount equal to your county and state dues for twenty years or even a lifetime. Recently a member lapsed in his dues. Suit against him was started. His attorney fees were $475.00—sufficient to pay his dues for twenty years. Against another doctor, who had been a member for but six years and whose total dues paid were $90.00, a suit was started and $1,180.00 was paid from the defense fund to attorneys who appeared in his behalf. Granted that he lives and practices forty years, he will still have saved $500.00 and all the while protected as well as participating in the other membership benefits. Society membership is a valuable asset.

When threatened or sued, immediately notify your local society medico-legal representative and Dr. W. J. Stapleton, Chairman, Medico-Legal Committee, David Whitney Building, Detroit. Do not engage an attorney. Do not discuss the case. Remain silent till you receive instructions from Dr. Stapleton. If you are in good membership standing your legal interests will be protected.

WHY WORRY?

Come, Scientists, come
Dinna burn up yer lum*
Alookin' for what's at th' end,
For a certain amoont
Ye canna accoont,
There'r' things that ye canna transcend.

Ye look oot beyond,
An' point wi' yer wand,
But th' nineteenth Psalm's what ye see.
Th' story ye face,
A laddie o' grace
Writ'ed doon, as true as can be.

If yer goitre's atoot,
An' tonsils nae oot
An' signs show a pituitary,
Yer said tae engage
In hormonic rage
An' a tempera-mental spree.

But ah am mindin' o' th' time ma faither used tae pray
Mair aften an' far better than faithers do today,
When tempera-mental silly sap, was treated wi' a strap,
An' faithers were th' Doctors, wi' th' patient cross their lap.
They didna ken sae much aboot thae endocreenic glaunds,
Bit they got a lot o' peppiness, a singin' o' th' Psalms,
An' thinkin' o' th' Davie lad, wha's slingin' stane did level
Th' bully o' th' country then, Goliath, th' auld devil.

Sae dinna greet
If ye canna meet
Scientific facts no in sight,
Just keep atryin'
An' aye relyin'
On David's, "In THY light is oor light."
Ah, Weel, Guid Nicht,

WEELUM.

"We are living in a phase of evolution which is known as the twentieth century and stands for a certain achieved growth of the human mind. But the enormous majority of the human race do not belong to that phase at all. . . . Twentieth century civilization is cluttered up with living fossils surviving from every barbaric phase of the past, and masquerading as twentieth century people because no attempt has yet been made to insure that human beings shall wear modern minds as well as modern clothes and every care has, on the contrary, been taken to provide them with superannuated misfits."

—BRIFFAULT, in *Rational Evolution*.

"All great things have been won by men who would not conform. Where would astronomy now be if the great ones had not risked excommunication? Where would the Darwinian theory be if its author had conformed to the views of the majority? Where would modern surgery stand but for Lister's disregard of the sneers of his opponents? . . . The history of science and of human thought proves that men are not grateful to the discoverer of such truths as tend to disturb existing notions. The instinctive tendency of mankind is to resent any disturbance of its placid hold of traditional beliefs and to muzzle or suppress the disturber."—BERNARD HOLLANDER.

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*"Lum" in the Scotch dialect means chimney.

MEDICAL ECONOMICS

MEDICAL REFORM

The following is the presidential address of Lord Dawson of Penn before the British Medical Association in its recent meeting at London. Lord Dawson is physician to King George. This summary of his address is given as reported in the Manchester Guardian.

"The art of medicine," Lord Dawson said, "embraces the understanding of illness, and if the physical and biological sciences are given a too-exclusive attention they are apt to give to medical thought a too-pronounced objectivity. We need to take count of the whole man. What of personality and its infinite variety? What of environment? In these days, when diseases of invasion are receding and diseases of stress loom larger, both these factors receive accentuated importance. A man's physical and mental make-up—his inborn trends—play no small part in the clinical picture he presents. To effect a cure, both aspects of the illness must be studied.

"Pervading these problems there is a fundamental error of thought—namely, that disturbances of your mind are under your control and are therefore your fault, whereas disturbances of your body are not under your control and are therefore your misfortune. This false doctrine of control, and all the perversions of the doctrine of free will with which it has long been entangled, is responsible for much faulty thinking and human suffering. Self-control can be bought too dearly or sought where it ill-belongs.

"And next as to treatment of these complex cases. Apart from remedies which are specific and those which assuage pain and assist relaxation and sleep, efficient treatment lies in comprehensive diagnosis. It is sometimes only necessary to explain an illness for the patient to cure himself. Let the doctor understand the component parts of the picture and explain faulty trends of thought and feeling and their relation to bodily function. Thus restoration of perspective and reassurance will follow, and the patient will be put on the road towards health. It is far easier to prescribe medicine than to give the patient healing.

"Persisting deviations from fitness require investigation. Hospitals and clinics will be needed for every class of citizen. There investigations can be made and results marshalled, and at less cost. Care will need to be taken that general practitioners do not become separated from their patients when the latter enter hospitals, for such would damage professional efficiency, to the disadvantage of the public. When the nature of the defects is disclosed the mere giving of medicines will often accomplish but little. What the patient wants is regimen and re-education in methods of living; treatment, it may be by diet, physicotherapy, and relaxation under controlled observation. Such treatment or education of the man and his tissues might take several weeks, and in most instances it would be advantageous for such patients to continue their ordinary avocations.

"We need a new type of institution—distinct from hospital provision—namely, a health hostel. Examples flow from any physician's experience. Overweight—the man of forty getting a fat body and a fat head, who avows himself a small eater yet is clogged with his own metabolic products; the man becoming set about the neck and waist, who turns his body slowly rather than his head and eyes quickly, or who is bluish and breathless, losing his rib movements and wants to 'stay put.' Then, again, the patient in the early diabetic stage, where not only himself but his wife needs instruction in food calories and cooking, and it may be in the administration of insulin.

"All such and many more need for a space a designed environment; they require education, but under the conditions of their working life. Such institutions must have a kitchen under a trained dietitian, and a physicotherapeutic department; skilled control, but no cults or fads. It would prevent disease in untold measure, and would be self-supporting and even profitable. The cost to the individual might, where necessary, be defrayed out of that comprehensive sickness insurance scheme which we wait long and wearily for the vision and the constructive ability of the insurance companies to provide.

"The good of the people demands education in matters of health. Would it not be possible for the medical faculty of a university to include among its functions the provision of approved health lectures when such are demanded by the districts within the area of its influence? In this way sound educational standards would be maintained—fads and fancies avoided. The objective of such teaching should be a knowledge of health, with only incidental or illustrative reference to disease. The result would be great saving of illness, and, therefore, in a few years, of expense. Medical insurance costs employers, employed, and the State £36,000,000 a year."

Lord Dawson criticised the opinion expressed by Lord Moynihan in his recent Romanes Lecture at Oxford that the craft of surgery had "almost reached the end of its progress along the lines which so far it has followed," that "the full fruits of Lister's work have now been garnered," and that with operations now carried out upon every organ in the body little further success can be expected.

"This," Lord Dawson said, "gives me to wonder and to think: Surely surgery has not reached so gloomy a finality. Has not the craft of surgery large fields yet to conquer? There come to my mind the thorax, the arteries, the nervous system, and the ductless glands, as examples which are on the threshold of their possibilities, whether of purpose or technic."

After discussing the beginnings of medicine in Egypt and in Greece, Lord Dawson recapitulated the marvelous discoveries in medicine made during the hundred years' existence of the B. M. A. He then indicated several problems still awaiting solution. "The expanding volume of knowledge," he said, "must in time make clearer certain problems of sex in health and disease. Further, it perhaps foreshadows the time when sex perversion will belong more to pathology than to crime and require medical as well as legal handling."

Lord Dawson, referring to the recent discoveries concerning the pituitary gland, said, "Surely the pituitary is the wonder world of the ductless glands. This structure, consisting of two lobes and set in the base of the skull, though weighing not more than three-quarters of a grain, in a special sense presides over our destiny. Here is a wonderful kingdom over which the minute pituitary gland rules enthroned in the middle of the skull. This gland presides over the destinies of ourselves and our descendants. The anterior lobe influences our growth and our sex—its dominance and degree. Perhaps Descartes was not far afield when he placed the soul in the pineal gland.

"In this country the quest for new knowledge is to be found in all and varied quarters, and a rich

harvest is being gathered. The Medical Research Council is doing a great service in supporting and directing efforts wheresoever they come, and it maintains contacts between workers and between the institutions to which they belong. There is, however, need for further coördination among bodies which represent varied aspects of medical knowledge, such as the basic sciences, medicine, surgery, obstetrics, education, and administration. It is a reproach against our profession that we do not establish means of giving collective advice when the art of government depends increasingly on our knowledge. To the hackneyed saying that 'doctors always differ' let me reply that the vain repetition of error does not convert it into truth. In fact, there is no sphere of learning in which consensus of opinion on matters of importance is so forthcoming as in that of medicine."

GENERAL NEWS AND ANNOUNCEMENTS

Dr. Harrison S. Collisi and family returned September 2 from a nine weeks' European trip.

Dr. Carl E. Badgley, who has been on the staff of the Henry Ford Hospital since 1929, returns to the University of Michigan, where he will be assistant professor of surgery. His duties begin October 1.

Dr. Floyd J. Barkman of Calumet and Dr. Burt R. Shurly of Detroit have received the Order of the Purple Heart for military merit during the world war.

Dr. F. C. Warnshuis, Grand Rapids, was elected President of the Aero-Medical Association of America at the annual meeting held in Cleveland September 2 to 5. The next annual session will be held in Chicago. Dr. D. S. Brachman of Detroit was elected Secretary.

There were twenty-two candidates for the office of Coroner of Wayne County at the primaries, seven Republican and fourteen Democratic. The successful nominees are Drs. Albert L. French and F. B. Broderick, Republican, and Drs. Edmund J. Knobloch and Albert A. Hughes, Democratic candidates.

Dr. W. B. Cannon, professor of physiology, Harvard University, will be the Beaumont lecturer on January 30 and 31, 1932. The Beaumont lectures were established by the Wayne County Medical Society eleven years ago. The name is that of a man whom Osler designated "The Backwoods Physiologist," the scene of whose research was on Mackinaw Island. The next series of lectures will commemorate the hundredth anniversary of Beaumont's pioneer work, that is, the publication of his book on digestion. The Beaumont foundation committee of the Wayne County Medical Society are making elaborate preparations and extend a cordial invitation to every member of the Michigan State Medical Society to be present.

The major handicap prize of the Wayne County Medical Golfing Association will be the gift of all living ex-presidents of the organization, which include: Drs. O. S. Armstrong, L. E. Maire, C. G. Jennings, A. N. Collins, A. D. Holmes, Angus McLean, L. J. Hirschman, Don M. Campbell, J. A. MacMillan, W. L. Babcock, John N. Bell, George E. McKean, Harold Wilson, J. E. Davis, Wm. M. Donald, Frank A. Kelly, Wm. J. Stapleton, Jr., H. A. Luce, J. H. Dempster, G. Van Amber Brown, E. G. Martin, A. S. Brunk, J. M. Robb, and H. W. Plaggemeyer. This beautiful trophy made its initial appearance at Thorncliffe on the occasion of the Third Annual Golfing Tournament of the Wayne County Medical Society.—*The Bulletin of the Wayne County Medical Society.*

According to the Educational number of the Journal of the American Medical Association, August 27, the total enrollment of students in the medical department of the University of Michigan for 1931-2 was 514; graduates in medicine 130. The faculty of the University Medical School consists of 22 professors, 12 associate professors, 30 assistant professors, 70 instructors and lecturers, a total of 134. Enrolled in the Detroit College of Medicine and Surgery were 315. The number graduated was 66. The faculty consists of 33 professors and 101 lecturers, a total of 134.

The next written examination of the American Board of Obstetrics and Gynecology will be held on Saturday, October 22, at 2 p. m., in 19 different cities of the United States and Canada. In order to reduce traveling expenses for candidates, special arrangements may be made through the Secretary for taking the written examination at any city other than those regularly specified where there is a Diplomate who can be empowered to conduct the examination. This arrangement does not apply to the general, clinical examination. For application blanks and other information, address Dr. Paul Titus, Secretary, 1015 Highland Building, Pittsburgh, Pennsylvania.

DR. E. A. CHRISTIAN HONORED

A complimentary dinner was tendered Dr. Edmund A. Christian, Superintendent of the State Hospital at Pontiac, on September 7, when about 150 of his frieds assembled to do him honor at the Wardell Hotel, Detroit. The occasion was his seventy-fifth birthday and the thirty-eighth anniversary of his connection with the hospital when he succeeded the late Dr. C. B. Burr as superintendent. Dr. Christian had performed a half century of service. Mr. R. G. Ferguson, of Sault Ste. Marie, chairman of the State Hospital Commission, acted as toastmaster. Among the guests was Governor Brucker, who in a brief address spoke of the high esteem in which the guest of the evening was held throughout the state.

Dr. Christian was born in Detroit, September 7, 1857. He entered the University at the age of eighteen, taking his A.B. degree in 1879 and his M.D. in 1882. An honorary degree was conferred upon him in 1906.

Dr. Robert Haskell produced letters and telegrams of congratulation from all parts of the United States and Canada, which he turned over to Dr. Christian.

Among the speakers was the Honorable Junius Beal, Regent of the University of Michigan, who

was a fellow student with Dr. Christian. He referred to the large number who had been "graduated" from the institution over which the doctor presided to "the world of clear thinking." Mr. Beal spoke of the importance of mental hygiene from the University students' point of view. In the University of Michigan, the general average of forty-eight out of every thousand had been reduced to five per

DR. EDMUND A. CHRISTIAN

thousand who succumbed to the stress of student life.

Dr. Carl F. Moll, president of the Michigan State Medical Society, associated the guest with such honored names as Dr. Barrett, David Inglis and C. B. Burr, and credited him with making the Pontiac State Hospital one of the foremost in the United States.

Dr. Irving H. Neff, of Detroit, spoke on behalf of the employees of the hospital, as he had served for a quarter of a century with Dr. Christian.

Dr. Robert L. Dixon, of Lapeer, declared that it was not so much the half century of service that counted as the inspiration to others that the guest had proven himself.

Dr. J. D. Bruce, vice-president of the University, spoke on the subject, "The Durable Satisfactions of Life," in the course of which he said that the period of Dr. Christian's activities had been the most productive of all time in both medical and social advances, and that during this period, without losing anything of his supreme individualism, the practitioner had advanced more rapidly in the assumption of social responsibilities than ever before. He felt that a man who had devoted himself to the practice of medicine for 50 years, as Dr. Christian had done, had fulfilled the highest obligations of citizenship. It would be of great interest to learn the viewpoint of Dr. Christian concerning what things he deemed most worthwhile in his notable service as a physician. Dr. Bruce was assured that this would stimulate in each a desire for greater usefulness and a more careful consideration of the value of all of our activities and interests. Consciously or not, man has struggled always for better and more enduring things. The solidarity of nations is built on the sum of individual expression. If each of us could approximate his ideals or even be animated by a desire to attain higher and more useful standards, we might partake of the best that life has to offer.

It is the physician's good fortune to be useful in man's first essential—physical and mental comfort or health. To relieve suffering, to correct disability, to guide in ways of health and even, though rarely, to save life, are the physician's privilege.

In his opportunity for intellectual activity the doctor finds that knowledge, skill, and constant intellectual advancement are not only necessary to success, but are a means of durable satisfaction. Success in the practice of medicine does not hinge on medical equipment alone but on an attitude of mind and a philosophy of life based upon a much broader fundamental training than that received in a standardized course of study.

Doctor Christian could not have satisfied the requirements of his position and lived a life of continued interest had it not been for a fine cultural background, a knowledge of books and things far beyond the confines of technical preparedness. The master word in medicine is intelligence that has been educated. "We are honoring tonight," said Dr. Bruce, "a member of our profession who has tasted to an unusual degree the durable satisfactions of life, and who is a symbol of the ideals and aims of his age."

Following Dr. Bruce's address a replica of a bronze plaque, the work of Carleton Angell, of Ann Arbor, was unveiled. The plaque, dedicated to Dr. Christian, was donated by a group of friends to be placed in the administration building of the Hospital.

The program was concluded by a reply by Dr. Christian, in which he declared the evening had been a complete surprise to him. He paid a high compliment to the capability and loyalty of his assistants and admitted that he possessed the faculty of selecting loyal and efficient coworkers.

There were friends present from all over the state, the affair being particularly represented by guests from Pontiac, Ann Arbor and Detroit.

The arrangements were in charge of a joint committee representing the State Hospital Commission and the Association of Medical Superintendents of the State Hospitals, consisting of Dr. Robert H. Haskell, chairman; the Hon. May Belle Downing, of Bay City; the Hon. Mary M. Hoskins, of Pontiac; the Hon. Enoch T. White, of Lapeer; and Dr. George F. Inch, medical superintendent of the Ypsilanti State Hospital.

COMMUNICATIONS

September 15, 1932.

Dr. F. C. Warnshuis, Secretary, Michigan State Medical Society in Convention Assembled, Kalamazoo, Mich.

The House of Delegates of the State Medical Society of Wisconsin assembled in its Ninety-First Anniversary meeting this week sends cordial fraternal greetings to the officers and members of the State Medical Society of Michigan, assembled in its one hundred twelfth annual meeting.

Cordially,

J. G. CROWNHART, *Secretary.*

OBITUARY

DR. WILLIAM F. BASTENDORFF

Dr. William F. Bastendorff of Detroit died suddenly in his office August 13, 1932. He was born at St. Johns, Michigan, seventy-one years ago and at an early age went to live at Dumbro, Ontario, where he resided until 1897 and then came to Detroit and took up the study of medicine, graduating from the Michigan College of Medicine and Surgery in 1900. For a few years he practiced at Halfway, Michigan, and then returned to Detroit, where he practiced up to the time of his death. He was a member of the Wayne County Medical Society, State Medical Society, American Medical Association, American Association of Retail Druggists and the senior club of the Wayne County Medical Society. He was also a member of the Maccabees. He leaves his wife, Margaret, and daughter, Mrs. Eva Maltas, the immediate family.

DR. EDWIN JOHN CORAM

The Wayne County Medical Society lost one of its younger members in the death of Dr. Edwin John Coram August 16, 1932. Dr. Coram was born at Grangeville, Idaho, December, 1893. After preliminary work in the University of Idaho, he was graduated from the University of Michigan Medical School in 1919.

DR. JACOB ROSENTHAL

Dr. Jacob Rosenthal died suddenly August 12, 1932, at his residence in Detroit. He was born in 1876, and was a graduate of Notre Dame University and the University of Pennsylvania School of Medicine. He was attached to the staff of St. Mary's Hospital and was a member of his county and state medical societies and a Fellow of the American Medical Association. He was well known in the Upper Peninsula and was a member of the Board of Pension Service. He is survived by his wife, Fannie, and a daughter, Florence.

MEDICAL HISTORY

Your Society expended $8,000 for the compilation and publication of a Medical History of Michigan in two volumes. There remain some 400 sets of this history on hand. To dispose of them the Council has reduced the price to $7.50 per set. Every doctor should own this truly excellent historical set of Michigan's Medical history. It is an appreciated gift to a friend or associate. Why not order a set from the State Secretary today? Payment can be made of $4.00 with the order and $3.50 in sixty days. Send your order today and enable the Society to dispose of these remaining sets.

SERVICE OBTAINABLE

Members are invited, yes urged, to avail themselves of the service that is yours at the State Secretary's office. Do you want an address, reference, specific information, clinical opportunities, or any other data? Write in for it. A prompt answer will be returned. If we haven't at hand that which you request we will secure it for you, if it is obtainable, or we will tell you where to inquire. A letter will bring you this service. You are invited to avail yourself of this service.

SOCIETY ACTIVITY

112TH ANNUAL MEETING

The Kalamazoo meeting is now a matter of historical record. It was appraised as our best meeting in five years. The registration, 1,076—796 members and 280 Auxiliary members—voiced their appraisal and expressed their personal appreciation of the excellent program that was carried out in full detail. The Kalamazoo profession were most cordial hosts.

Complete minutes will be printed in the November Journal. Our members are urged to look forward to that issue. Important actions were adopted and vital policies were decided on by the House of Delegates

Dr. George L. Le Fevre of Muskegon was deservedly elected President-Elect. Grand Rapids was selected as the 1933 meeting place. Drs. T. F. Heavenrich, Paul Urmstrom, J. F. Powers and Harlan McMullen were re-elected Councilors. Dr. T. P. Treynor was elected a Councilor to succeed Dr. Le Fevre. Dr. Henry J. Pyle and Dr. C. E. Dutchess were elected Speaker and Vice-Speaker. Drs. J. D. Brook, H. A. Luce and C. S. Gorsline were re-elected delegates to the A. M. A.

Our Society sets forth on a new year of activity inspired by the spirit engendered at the Kalamazoo meeting. Under President Robb's leadership and inspiration we shall go far and accomplish much. Members are advised to watch the Journal for progress reports.

SAVING EXTRAS

Reduction of costs is a popular pastime. The great majority of citizens have adopted that plan in their professional, business and personal affairs. It was not by choice. It was a compelling necessity. We all are realizing that we had been extravagant. We indulged in luxuries and ease which we now realize we could get along without and still be comfortable and happy. We can do good work without them.

So, too, in Medicine. We played the extras that were not essentials. It was easier and pleasanter. Patients were sent to hospitals and seen on our rounds in a shorter

time than it would take to make individual calls at their homes. It made for more leisure time. Minor cases were hospitalized when they might have been cared for in the home.

We have learned a lesson. Necessity compels the saving of these extras today, and if the lesson is well learned they will be saved in the future. If tonsils can be removed in the office they can be removed at home. Cysts, lipomas, circumcisions under local anesthesia can be done in the home or office. Many other minor surgical procedures need not require hospitalization. That expense can be saved and the probabilities are that the saving will result in prompter payment of services.

In therapy a little time spent in re-familiarizing ourselves with our materia-medica will reduce prescription and drug cost. Proprietary preparations can be safely substituted by a regular prescription for the essential drug and accomplish a saving.

Cessation in fads and the discarding of some of the serum rackets will produce savings. The recognition of the limitation of physiotherapy will eliminate expense.

Violet and infra-red rays have limited application, as also diathermy. Plaster can be made as a perfect splint and will do away with expensive mechanical devices. Gauze purchased by the bolt and cut into convenient sizes and sterilized by the office girl will accomplish a saving in dressings.

We cite but a few instances. A sincere review of methods and treatments will uncover a number of other non-essentials and luxuries which when eliminated will be productive of saving cost and expense to both patient and physician. Why not, if you have not already done so, begin saving extras today?

MAY WE HAVE?

1. Reports of every county meeting and what your local society is accomplishing. Reports should be in the State Secretary's hands not later than the fifteeenth of each month.
2. News items of general interest.
3. Patronage of our advertisers. Give them your business in preference to non-advertisers.
4. Subscribers to our Medical History—two volumes at $7.50 per set. They are a splendid and appreciated gift to friends, hospitals and libraries.
5. A resolve to participate actively in the work of your county society, and to accept and discharge committee duties.
6. The extending of an invitation to every eligible doctor, urging him to affiliate.
7. Not knowingly or unknowingly to be the cause for a damage suit against a fellow physician by ill-advised remarks or comments.
8. Coöperation with your local health officers.
9. Advising your patients to permit your vaccinating and immunizing their children and to do it yourself at a reasonable fee.
10. Calling consultation and assistance in all serious cases and those in whom the diagnosis is undetermined.

WOMAN'S AUXILIARY

What has been said regarding the activity of County Societies applies directly to the Woman's Auxiliaries. Auxiliaries merit existence only when they achieve and accomplish definite ends. There is no need for a new social organization. Too many of that type already exist. Auxiliaries that accomplish definite ends, exercise educational influences and initiate constructive programs are the only ones whose existence is justified.

The word and advice therefore goes forth for local auxiliaries to establish immediate contact with the officers of County Societies, decide upon a program of local work and then bend every effort to complete the work. It devolves upon every auxiliary to justify its value and existence.

RESUMPTION OF MEETINGS

Fall marks the resumption of Society programs and meetings. A wide opportunity confronts every county society. Scientific papers, case reports and discussions characterize the major features of a meeting. They should, however, not be the sole feature.

A certain amount of time should be devoted to society business and the consideration of community problems. The county society should concern itself with community interests and exercise a wholesome guiding influence. Such influence may well con-

cern itself with health matters, school problems, the activities of Parent-Teacher organization, local government, hospitals, care of the indigent, and all and every local business or movement which concerns every individual. Participate in the programs of luncheon clubs, business organizations and Legion posts. Impart to them helpful medical and health facts and induce coöperation in establishing the observance of sound medical and health principles.

Such community participation may best be instituted through committees composed of members whose vision is broad and who will contribute time and effort in study and application. We commend and cite as exemplary the work being done by committees from the Wayne, Kent, Muskegon, Ingram, Saginaw, Oakland and Jackson counties. Their activities may well be duplicated.

A society composed of ten or twenty members can achieve just as much good and initiate equal reforms and establish similar influences as can the larger societies. Just because a small membership constitutes your county society is no reason for inactivity. Equal opportunity is yours.

It is therefore advised that at your next meeting, time be allotted for discussion of community problems and that a program of work and the requisite committees be decided upon. Set out to secure the recognition and good will of your fellow citizens. It is the duty of presidents and secretaries to initiate and prod the work of committees.

In these days of changing conditions, when new relationships are being established, county societies can find many opportunities for well directed activity. How many societies will embrace the opportunity?

SURVEY OF MEDICAL AGENCIES

The committee in charge of this survey is continuously active in the completion of its task. Its work will be expedited if members will be prompt with their replies. Prompt activity on the part of County Public Relations Committees will further add to the rapidity with which final findings can be tabulated and published.

All are urged to subscribe personal response and immediate answer of all inquiries. You will profit by the end-results.

COUNTY SOCIETIES

NORTHERN MICHIGAN

The regular monthly meeting of the Northern Michigan Medical Society was held at the Perry Hotel, Petoskey, September 8, with an attendance of about fifteen members.

The meeting was called to order by Vice President Grillet. The secretary's report was read and approved. Dr. Engle, Petoskey, was appointed to the program committee. A motion was made to instruct the secretary to send flowers to Dr. Armstrong, who was confined to his home with illness.

The rest of the evening was spent in hearing the report of the Public Relations Committee in regard to its progress in drawing up an indigent fee bill. There was a great deal of discussion and the various members were heard from.

Motion was made and carried that a special meeting of the society be called for Thursday, September 29, the meeting to deal exclusively with the fee bill.

Dr. Larson of Levering and Dr. McMillan of Central Lake applied for membership in the society. Their applications were referred to the Membership Committee.

The secretary was requested to use either telephone or telegraph to notify members of the special meeting. The meeting was recessed to September 29.

ERVIN J. BRENNER, *Secretary.*

A CONVENIENT NEW PHARMACOLOGY OF THE MEDICINAL AGENTS IN COMMON USE

The student of medicine will always find the large standard texts on pharmacology indispensable for critical study of the actions and uses of drugs. These texts, however, are in many instances so voluminous that they are not available for ready reference or for study in spare moments.

Heretofore there has been no comprehensive, small-size work on pharmacology. To meet this need Dr. Stanley Coulter, Dean Emeritus of the Purdue University School of Science, spent over three years in the preparation of a compact treatise on the pharmacology of the drugs now in common use by the medical profession. In this work he had the coöperation of members of the medical and research staffs of the Lilly Laboratories.

The subjects are alphabetically arranged for quick reference. Under each title there is a terse statement of the constituents of the drug, its physiological action, dosage, and brief mention of its more important therapeutic uses.

This Pharmacology is prepared with special attention to the needs of the medical student. The main part of the text dealing with individual drugs is followed by an appendix of tables and miscellaneous information useful to the medical student. In no sense is this book intended to supplant the larger standard texts on pharmacology. On the other hand, it is the hope of its author and the publishers that the use of the pocket-size book will so intrigue the student in the subject that he will be led to closer studies of the great authorities on pharmacology.

The book is supplied in flexible fabricoid binding, 254 pages, 3⅛ by 6 inches, green edges; published by Eli Lilly and Company, Indianapolis; price 50 cents per copy postpaid.

OF GENERAL MEDICAL AND SURGICAL INTEREST

THE X-RAY UNIT OF THE HOSPITAL OF THE UNIVERSITY OF MICHIGAN

The following description of the new X-ray Department of the University of Michigan appeared in *Science,* April 22, 1932.

"After four months of remodeling and installing new equipment, the University of Michigan Hospital . . . opened recently its new X-ray department, which is said to be unexcelled by any similar installation in the country.

"The new unit is featured by a novel plan of rooms and apparatus which stresses convenience and privacy for patients and the quick processing of the X-ray films. From waiting rooms the patients are directed to private dressing rooms from which they pass as called, by private corridors, to the proper department. A complete 'traffic system' of lights, which indicate what rooms are in use to all offices of physicians and the directing staff, makes possible quick routing of patients, so that routine X-ray examinations may be made at the rate of twenty an hour.

"Rapid development of films to aid physicians to make an early diagnosis is made possible by a modern dark room, provided with dry air from which all moisture has been chilled out by special refrigerating machinery. Once in operation for the day, the room need never be lighted or work stopped, the completed films being passed out through a double-doored, light-tight well for final rinsing and drying. From the drying rack they may be taken directly to the physicians' offices, each of which has its own viewing apparatus, so that a report may be given in a fraction of the usual time needed.

"Among the other details of the equipment are lead lined rooms which confine the rays of high voltage treatment apparatus, with lead glass through which the doctor or technician may observe the patient, a room in which X-ray films of the chest of bed-ridden patients may be taken through the bed by apparatus beneath the floor, special equipment for locating foreign bodies in the eye, and automatic apparatus, which, as soon as one patient's films are made, resets itself for the second stereoscopic exposing. Memorializing Dr. Preston M. Hickey, for many years head of the department, is a staff library which will contain publications on roentgenology, given by Dr. Hickey's friends, former associates and assistants, and a complete set of special X-ray studies of normal and diseased parts for reference. Classrooms and research laboratories for medical students are also provided within the department. The memorial bas-relief of Dr. Hickey, presented this last year by the American Roentgen Ray Society, has been hung in the special conference room set aside for the members of the hospital staff who wish to review the examination of their patients with members of the roentgenology staff."

WHAT IS SCIENTIFIC MEDICINE?

(New England Journal of Medicine)

One frequently finds the expression "scientific medicine" but rarely does one come across a clear exposition of what the term means. Of each cult there is a definition, clear enough as far as words go, though it is not always so clear that the practice of the cult falls within the limits set by the definition, and there is added a dogma or doctrine or theory of disease and its treatment which is comprehensive in scope and adequate in efficiency (for the sectarian).

Contrasted with this is scientific medicine. It has no single theory of disease; its doctrines are numerous and change from time to time. If any doctrine becomes dogma it is suspect at once and is on its way to rejection from the field of science. If one can get a comprehensive view of scientific medicine it may seem to contain a mass of heterogenous knowledge, with contradictions and inconsistencies, with large areas of ignorance, vast fields of unknown and unexplored country. It is much like matter to the physicist. Ordinary matter of which one builds steel and concrete structures seems quite dense to the physiological eye of the physicist. To his electronic eye the ultimate particles of which matter is composed are astonishingly far apart.

This is an apt figure of comparison. For the scientific physician, overcrowded as he may seem to be with knowledge so much more abundant than he can ever acquire, the unknown is far greater than the known. The problems in medicine to be solved far outnumber those solved even in tentative fashion. Every problem solved opens up new fields of inquiry and investigation and research. There is an abundance of facts for which no conciliation has been found and their significance has not been determined. There are inconsistencies seemingly hopeless, with present knowledge. There are contradictions intolerably irritating in their insistence on the need for deeper insight and greater understanding.

All these things are true of scientific medicine. It has made but a beginning, yet it has chosen the better part. One speaks of the cults and scientific medicine. A more justly antithetic statement is dogmatic and scientific medicine, for this expresses the essential weakness of the cults.

Scientific medicine varies in content from year to year, searching for new knowledge, leaving acquisitions that have been outgrown; it is patient, humble, seeking knowledge from any and every source, but trying everything that comes to it in accordance with strict rules of evidence, asking always, What is the evidence, what is the evidence, what is the truth?

PROGRESS OF OPHTHALMOLOGY

HARRY FRIEDENWALD, Baltimore, concludes his discussion of the growth of ophthalmology with the statement that the first third of the twentieth century has added little in the discovery and description of new disease categories excepting in relation to those associated with the pituitary gland, with vitamin deficiency and nutritional disturbances and with encephalitic diseases that have appeared in recent years. But important advances have been made in the diagnostic and therapeutic use of the X-rays and radium. The successful application of the microscope to the examination of the anterior segment of the eyeball has enabled ophthalmologists to study pathologic changes and processes during life which were formerly only to be observed in the laboratory. Improvements have been made in the ophthalmoscope which have increased the precision of examination, such as the elimination of reflexes, the use of illumination with light of different colors and especially with red free light and with monochromatic light and the correction of spherical and chromatic aberration. There has been much experimental study bearing on the nutrition of the various parts of the eye, the chemical changes in the intra-ocular fluids, studies which the author believes are destined to throw light on those obscure processes leading to the various forms of cataract and glaucoma. The effects of various forms of radiant energy on the eye have been carefully investigated. In many ways

research has been directed to solve the many problems which the eye presents, whether considered anatomically, physiologically, embryologically or pathologically. The introduction of instrumental aids, the spirit of research of great teachers and the extraordinary development of physical and biologic sciences, which gave inspiration to every department of science and medicine, explain the marvelous growth of ophthalmology since the middle of the nineteenth century. With every advance of knowledge, there open new vistas of the unknown. The problems become more and more intricate; they deal with the fundamental processes of nutrition and repair, with the reactions of tissues, cells and protoplasm to the many substances from without and from within the organisms that act on them. Investigations require the aid of general physiologists and pathologists and of biochemists in cooperation with clinicians. It is in the line of natural development that university laboratories and institutes of ophthalmology have been founded in recent years, for only through them can such coöperation in scientific investigation be secured. It is from them that the next great advances in ophthalmology are to be looked for.—*Journal A. M. A.*

DIET IN BRIGHT'S DISEASE

JAMES S. MCLESTER, Birmingham, Ala., points out that the diet which is gaining recognition today as suitable for the patient with Bright's disease is radically different from that of the past. Formerly, in treating this disease, physicians thought only of the kidney; today, in keeping with modern ideas of treatment, the chief consideration is for the patient himself. It was the custom to think only in terms of protein catabolism and of the harmful effects of its end-products, and consequently the patient was told that he must eat no meat. Now attention is directed to the anabolic influences of protein, its upbuilding effects and beneficial influence on repair processes, and the patient is told to take liberal amounts of this essential food stuff. The whole protein problem is a much vexed one. Undue emphasis has been laid on the supposedly harmful effects, even in health, of nitrogenous degradation products, while the essential rôle which protein plays in repair processes and in the maintenance of vigor seems to have been largely overlooked. The weight of evidence would indicate not only that a large protein intake per se is without harm, but, further, that if man would enjoy full health and sustained vigor his consumption of protein must of necessity be liberal. This applies not only in health but in large measure in disease as well, notably in Bright's disease. A distinguishing feature of Bright's disease in its acute hemorrhagic and chronic degenerative forms is a marked loss of body protein. The infection which causes nephritis, whether it be of scarlet fever or tonsilitis, or some other form of bacterial invasion, produces, first of all, a toxic destruction of body protein; then as the disease progresses there follows a marked loss of albumin through the urine, which entails an excessive drain on the body proteins and results finally in a measurable plasma protein deficit. It would appear that in acute hemorrhagic nephritis the chances for complete recovery depend largely on one's ability to compensate for the protein loss. This can be accomplished in but one way: by permitting a liberal intake of protein, adequate in amount to make good the deficit. It is difficult to state accurately the amount of protein which should thus be included in the ration of an adult with acute and subacute nephritis. The daily allowance at the present time is usually between 40 and 50 Gm., but judging by the author's experience as well as the carefully controlled experiments of McCann and others, one would conclude that approximately three times this amount, that is, 150 Gm. daily, is more nearly correct. The composition of the diet in other respects also is of importance. Since the total quantity of food should be ample to meet the patient's metabolic needs, there should be included, in addition to the protein quota, fats and carbohydrates in amounts sufficient to cover his requirements for energy. For economy in nutrition, carbohydrate should provide at least 50 per cent of the caloric value of the ration, preferably more; only in this way can it be assured that the protein of the food will be used for purposes of repair rather than burned for the production of energy. The type of food chosen, provided these specifications are met, is of little importance, with one exception: The protein should in large part be of high biologic value such as is found in meat, milk and eggs. In general it can be said that if the adult with nephritis takes a quart of milk daily, two eggs and one large serving of meat, his need for protein will be covered and no harm will be done his kidneys.—*Journal A. M. A.*

NEUTROPENIC STATE

According to CHARLES A. DOAN, Columbus, Ohio, the neutropenic state may be chronic or acute, constant, recurrent or nonrecurrent. In diagnosis it must be sharply differentiated from the leukopenia associated with many other clinical syndromes. The chronic condition of moderate leukopenia may either mean a normal physiologic equilibrium maintained at a level somewhat lower than the average, with no detectable influence on the normal health of the individual, or it may reflect a low myelocytic reserve in the marrow with constant potential danger of marrow insufficiency and decompensation. The acute or malignant neutropenic state presents a crisis that is rapidly fatal if recovery of marrow function is not initiated promptly. The underlying pathologic condition may include myeloid hypoplasia or hyperplasia. Experimental and clinical observations form the basis for attributing to nuclei acid and to the nucleotides chemotactic, maturative and initiatory stimuli for neutrophilic myelocytes when the basic mesenchymal tissues from which they arise are in a condition to respond. Blood transfusion and irradiation may act through the same nucleotide mechanism, when effective. The latter, because of its potentially destructive affinity for hematopoietic tissues, must be used with great caution when stimulation is desired. Further experimental studies are needed to ascertain whether the X-rays may be really primarily stimulatory to myeloid tissue without a preceding destructive phase.—*Journal A. M. A.*

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THE DOCTORS' LIBRARY

THE SPUTUM; ITS EXAMINATION AND CLINICAL SIGNIFICANCE. By Randall Clifford, M.D., Associate in Medicine Peter Bent Brigham Hospital; Assistant in Medicine Harvard Medical School. Formerly Associate physician and director of pulmonary clinic Massachusetts General Hospital. New York: The Macmillan Company, 1932. Price $4.00.

In the 167 pages that make this book, the author has brought together laboratory and clinical data that would require the reading of many technical medical papers on the various subjects treated. An examination of the sputum has meant for perhaps the majority of doctors a search for the tuberculosis bacillus. The author has proven that it has a much wider application. He has given in detail methods of preparing slides, staining sputum and interpreting the findings. There is also a section on the microscopic examination. The book is well illustrated and many of the illustrations are in colors. An extensive bibliography at the end of each section suggests avenues for further study.

A MANUAL OF DISSECTION. By George B. Jenkins, M.D., Professor of Anatomy in the George Washington University Medical School, Washington, D. C. 289 pages. Limp binding. Phila.: Lea & Febiger, 1932. $3.00.

This manual treats of dissection in four subdivisions: head and neck, upper extremity, thorax and abdomen, and lower extremity. The sections may be followed separately or in order. The work, devoid of illustrations, consists of short and exceptionally clear descriptions of the parts met in the order of dissection. The method of approach is practical and, if supplemented by systematic lectures, atlases and reference texts, should form the basis for a sound introduction to gross anatomy. A supplementary section summarizes the vascular and nervous systems. That part on the peripheral nerves, arteries and veins should prove helpful to the student. The section on the lymphatic system is misleading in that the course of lymphatic drainage is ignored—node groups alone being summarized. The sympathetic system is likewise poorly handled since only the gross features of the thoraco-lumbar innervation are dealt with. This work will appeal especially to the reader who wishes to review his anatomy. The clear, concise descriptions will appeal equally to student and surgeon. Although topic headings are lacking in the text, an adequate index compensates.—W. T. D.

MENTAL DEFICIENCY DUE TO BIRTH INJURY. Edgar A. Doll, Ph.D., Director of Research, The Training School at Vineland; Winthrop M. Phelps, M.D., Professor of Orthopedic Surgery, Yale University School of Medicine, Consultant on Birth Injuries, The Training School at Vineland; and Ruth Melcher, M. A., Research Assistant, The Training School at Vineland. Price $4.50. New York. The Macmillan Company.

The authors were motivated by a belief that in spite of the complete motor helplessness of certain birth-injured children, some of them at least were not mentally retarded nor destined to become so except as their motor handicaps prevented all expression of the natural development of their intelligence. As an initial step toward further research, twelve subjects whose mental deficiencies were associated with birth injury were chosen for study. Selection was based upon neurological diagnosis of cerebral injury, presumably sustained at birth, as the cause of the present condition, and upon available data as to family history, birth history and developmental history. Their motor disabilities were enumerated. A classification of the subjects into two groups was made with a view toward precision in estimating the importance which may be attached to the injury at birth in the production of the later mental deficiency. In applying mental tests and measurements the Stanford-Binet Scale was first employed. The results obtained are interestingly presented and compared with further data obtained from these methods: The Meyers Mental Measure; The Goodenough Drawing Test; The Healy Pictorial Completion Test II; The Porteus Maze Test; The Witmer Form Board Test; The Ohio Literacy Test; The Detroit Word Recognition Test; and Morgan's Mental Test. In arriving at mental estimates, the authors have taken up three cases in detail, enabling us to follow their reasoning. The mental growth of twelve cases is presented and analyzed. Physical therapy was also employed in an effort to rouse and hold interest. A chapter is devoted to the etiology of birth injuries, giving the varieties, predisposing and causative factors and also the immediate and late symptoms of intracranial injury. The development of intelligence cannot be successfully evaluated except through speech and movement. The authors have interestingly put forward their pioneer efforts in a previously little enough considered field.

A TEXTBOOK OF EMBRYOLOGY. By Mary T. Harmon, Ph.D., Professor of Zoology in the Kansas State College of Agriculture and Applied Science, Manhattan, Kansas. 476 pp. 284 illust. Phila.: Lea & Febiger, 1932. $4.25.

The first third of this work is devoted to early general embryology with particular emphasis on the human. It is simply written and is adapted to the beginning student. The bulk of the book treats of human organology. Its scope is extensive, but many of the organs are handled in a very superficial way. An appendix, serving as a laboratory outline, seems quite well adapted to the needs of pre-medical or pre-dental students.

W. T. D.

THE COST OF THE AFTERMATH OF WAR

(Editorial in Detroit Saturday Night)

It may surprise a lot of folks to learn that Uncle Sam is now giving free hospitalization, medical, surgical and nursing service to 680,000 men who were in the army during the world war. It will doubtless surprise them much more to be told that approximately 70% of the available beds in veterans hospitals are occupied by men with disabilities *incurred in civilian life.* These men are now costing the government $75,000,000 a year, and one naturally wonders why they should have this service any more than any other citizen who has done his duty by his country.

It is a startling fact that although Great Britain had many times as many men wounded in the war than we did, we are today giving hospital care to nearly four times as many ex-soldiers as Britain is. (This statement is made on the authority of the New York *Sun.*)

So far, our war veterans have been paid, for relief, a total of $6,000,000,000, or $1,500 per man, from the U. S. treasury. And the lobbyists—who, to be fair to the veterans, are not all ex-service men—have clearly outlined a course of legislation that before the last soldier of the world war passes on, would set the government back over $100,000,000,000.

Do you realize that the figure means the war would then have cost this country for relief alone $25,000 per enlisted soldier? That is a prospect to make any thoughtful citizen shudder for his country's financial future.